



Final EXAM 2015/2016 - First Term

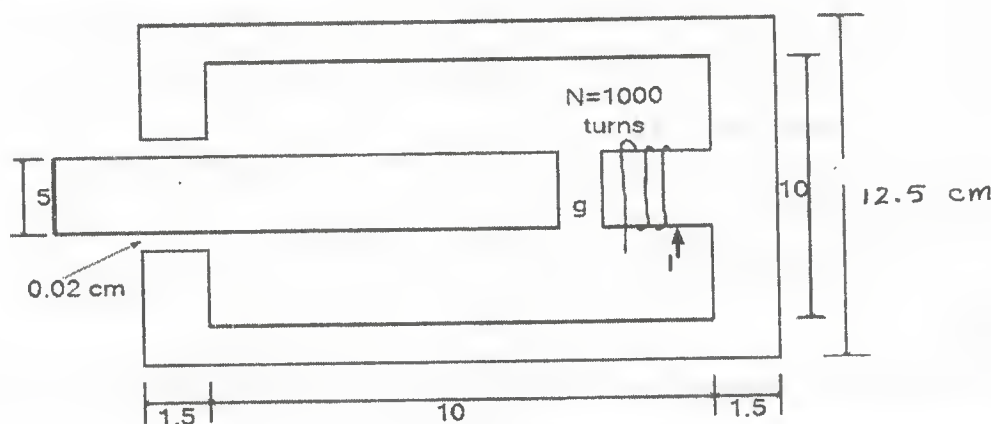
Course	Energy Conversion (EPM2106)	Time Allowed	3 hours
Students	2 nd Year (Electrical Power and Machines)	Total Mark	90
Date	13/1/ 2016	Number of pages	2

Attempt ALL the following questions and problems:

- Clarify your answer with the suitable sketches as you can.
- Assume any missed data reasonably.

The First question

1. The device shown in the figure is a practical form of magnet. It is cylindrical about a horizontal axis. The coil current carries a constant of 3.0 A. if the mmf in the iron is neglected.
- Compute the flux densities, in tesla, between the working faces of the center core and the plunger for gaps $g = 0.25$, and 0.5 cm.
 - Compute the corresponding values of the coil inductance at two air gaps.
 - If the current increased from 3 A to 6 A compute the corresponding values of the coil inductance at two air gaps.



2. For a magnetic circuit that contains of a part of permanent magnet material and an air-gap, show how the magnet and air-gap dimensions affect the operating point.

The Second question

- A 3-phase 16-pole, star connected, alternator has 192 slots with 8 conductors per slot and the conductors of each phase are connected in series. The coil span is 150° electrical. Find the phase and line induced emfs, if the flux per pole is 64 mWb sinusoidally distributed and the machine runs at 375 r/min.
- Explain the dot convention employed to determine the polarity of the mutually induced voltages. Then show how it can be determined experimentally.
- Both analytically and graphically, show that balanced three-phase windings excited by balanced three-phase currents produce a single rotating MMF wave.

Please Turn Over

The Third question

1. Determine the main dimensions, number of stator slots, number of turns per phase, and conductor cross section area of a 50 hp, 380 volt, 1450 r/min, 50 Hz, 3-phase induction motor star connected. Assume Specific magnetic loading = 0.5 tesla, specific electric loading = 30000 A/m, efficiency = 0.9 and power factor = 0.9. Winding factor = 0.955, current density = 3.5 A/mm² and the ratio of core length to pole pitch is 1.25.
2. Using suitable clarifications of sufficient data, show the following:
 - a) Solar cell characteristics
 - b) Wind turbine characteristics
 - c) Components of a photovoltaic generating system.
 - d) A wind-energy-based generating system.

The Fourth question

1. With the aid of suitable mathematical relations, define what is meant by transformer and rotational induced voltages. Then show with explanation what is the type of voltages induced in
 - a) The secondary of a transformer.
 - b) The stator of a synchronous machine.
 - c) The rotor of an induction motor.
2. Define **co-energy**. Then **derive in details** how it can be used to obtain **the force** developed in a singly-excited electromechanical energy translational converter
3. An electromagnet of 5 cm² cross-section area and 1000 turns coil is used to control a relay. The magnet has an air gap length of x. Assume that the reluctance of the iron parts is negligible. It is required to develop a constant force of 50 N:
 - a) For a range of $x < 5$ mm, plot the relation between x and both the required current and corresponding stored energy
 - b) If the coil current has not to exceed 2 A, what is the range of x?

The Fifth question

1. For a doubly-excited electromechanical energy conversion device of **cylindrical stator** and **salient-pole rotor**:
 - a) Sketch the space variation of self and mutual inductances.
 - b) Derive a general expression for the electromagnetic torque acting on the rotor.
 - c) Show all the possible electrical machines can be obtained.
 - d) For zero rotor current, show how to obtain the energy converted into mechanical form when moved from a position to another. In your answer:
 - i. Derive ALL necessary relations.
 - ii. Define the two positions for maximum mechanical energy.
2. A two-pole rotating electromechanical energy conversion device with double saliency is singly-excited via stator. The maximum and minimum stator winding self-inductances are 2 and 1 H respectively. The excitation current is sinusoidal of 50 Hz and 10 A (rms). Determine:
 - a) Rotor speed that achieves non-zero average torque.
 - b) An expression for average torque.
 - c) The condition for maximum average torque.



Course Title: Numerical analysis
Date: (First term)2016

Year: 2nd Elec. Power PME2109
Allowed time: 3 hrs

No. of Pages: (2)

Q (1) (25M)

(a) Use Lagrange polynomial to find one root of $\cosh x + x - 3 = 0$

(b) Deduce the form of Newton's divided difference low where

$$F[x_{i+1}, x_i] = \frac{y_{i+1} - y_i}{x_{i+1} - x_i} \quad \text{and} \quad F[x_{i+2}, x_{i+1}, x_i] = \frac{F[x_{i+2}, x_{i+1}] - F[x_{i+1}, x_i]}{x_{i+2} - x_i}$$

(c) From the following table find

x	0	0.5	1	1.5	2	2.5	3
f(x)	2	2.7	3.1	5.2	7.2	9	11

(i) Find $f(0.21)$, $f(1.1)$ and $f(2.55)$

(using Newton's and Stirling methods)

(ii) $D_{2,2}$ (Ricardson extrapolation) where $D_{1,1} = f'(1)$.

(iii) $f'(0)$, $f'(0.1)$, $f'(3)$ and $f''(1)$

Q (2) (25M)

(a) Deduce the recurrence form of Romberg algorithm

$$R_{n,m+1} = \frac{4^m}{4^m - 1} R_{n,m} - \frac{1}{4^m - 1} R_{n-1,m}$$

(b) Find an approximate value of $\int_0^2 e^{x^2} dx$ by using

- Trapezoidal rule
- Simpson rule
- weddle method
- Find $R_{2,2}$ (Romberg extrapolation)
- Gauss three-pionts

Q (3) (25M)

(a) Deduce the truncation error form of Euler method for solving

$$y' = f(x, y), y(x_0) = y_0, \left| \frac{\partial f}{\partial y} \right| \leq M, \left| \frac{d^2 y}{dx^2} \right| \leq K \quad \text{and use this form to find the}$$

truncation error for $y' = y + e^x, y(0) = 1$ with exact solution $y = e^x + xe^x$ and $h=0.2$

- (b) Tank T_3 contains initially 200 gal of water in which 160 lb of salt are dissolved. Tank T_1 contains initially 100 gal of pure water. T_2 contains initially 100 gal of pure water. Liquid is pumped through the system as indicated, and the mixtures are kept uniform by stirring. Find the amounts of salt $y_1(t)$, $y_2(t)$ and $y_3(t)$ in T_1 , T_2 and T_3 , respectively at $t = 0.6$ use $h=0.2$.

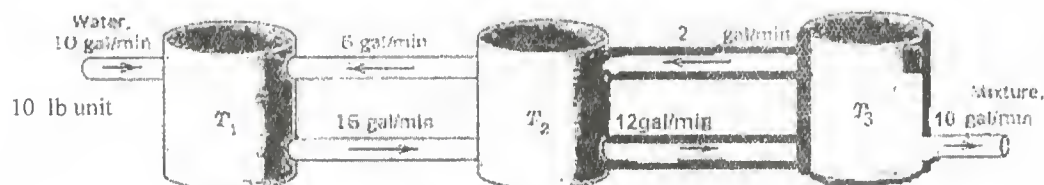


Fig. Tanks in Problem

Q (4) (25M)

(a)

Let δ, ∇, Δ and D be forward, backward, center and derivative operators. Show that

$$(i) \quad D = \frac{2}{h} \sinh^{-1} \left(\frac{\delta}{2} \right)$$

$$(ii) \quad \delta^n f_{i+\frac{n}{2}} = \nabla^n f_{i+n} = \Delta^n f_i$$

(b)

Use finite difference method to find the solution of Laplace equation $u_{xx} + u_{yy} = 0$, with boundary conditions $u(x,0)=x(1-x)$, $u(0,t)=1$, $u(1,t)=0$ and $u(x,1)=x(1-x)$

(c)

Use Newtons, backward formula to derive Adams-Bashfourth four-step Method then use it to find $y(0.6)$, $h=0.2$ for

$$y' = \sqrt{2x + y} \text{ where } y(0) = 2$$



TANTA UNIVERSITY
FACULTY of ENGINEERING
DEPARTMENT OF ELECTRICAL POWER AND MACHINES ENGINEERING
EXAMINATION (SECOND YEAR) STUDENTS OF ELECTRICAL ENGINEERING



COURSE TITLE: ELECTRICAL POWER ENGINEERING (1)

COURSE CODE: EPM210S

DATE: 16/1/2016

TERM: FIRST

TOTAL ASSESSMENT MARKS: 90

TIME ALLOWED: 3 HOURS

Q1: (28 Marks)

A. Write short notes on the following:

- i. Skin effect
- ii. Transposition of conductors
- iii. Balancer machines set (6 Marks)

B. A 50-Hz double-circuit 3-phase line is arranged as shown in Figure 1. The conductors are completely transposed and are of radius 1 cm each. Find,

- The inductance per phase per km and the corresponding inductive reactance.
- The capacitance per phase per km and the charging current at 138 kV. (12 Marks)

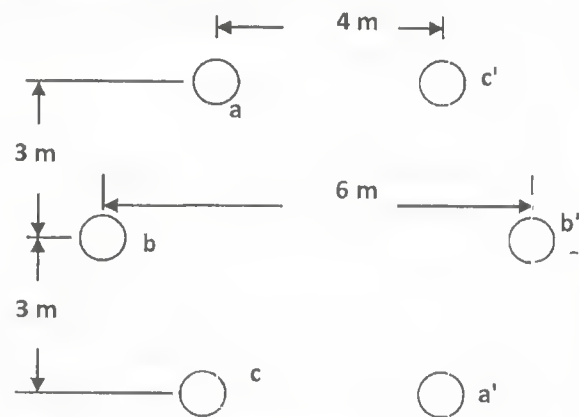


Figure 1

C. A three-phase, 50 Hz transmission line has the following parameters per phase: resistance = 12 Ω , inductance = 63.66 mH and capacitance = 1.06 μ F. Using the nominal T-method, calculate:-

- ABCD constants of the line.
- Sending end voltage, current, power, and power factor.
- Transmission line efficiency and voltage regulation.
- Draw the complete phasor diagram.

The line supplies a balanced load of 50 MW at 132 kV and a power factor of 0.8 lagging.

(10 Marks)

Q2: (20 Marks)

A. Compare the volume of conductor material required in 3-phase 4-wire system and 3-wire d.c. system assuming that:

- i. The amount of power P transmitted is the same
- ii. The voltage V at the consumer's terminals is the same
- iii. The efficiency of transmission is the same
- iv. The area of X-section of neutral wire is the same of the outers. (5 Marks)

B. Mention the different methods used to improve the voltage distribution over string insulators in overhead transmission lines. Which method is practically used? (5 Marks)

C. A string insulator has 4 units and each unit has a safe working voltage of 15 kV. Find the maximum line voltage on which it can be operated safely and find the string efficiency. The ratio of self-capacitance to shunt capacitance of each unit is 8:1. Derive any expression used. (10 Marks)

Q3: (22 Marks)

- A. Derive an expression for the total power losses and the minimum voltage in a uniformly loaded distributor fed at both ends with equal voltages. (6 Marks)
- B. A single phase AC distributing feeder 1 km long has a total per conductor resistance and reactance of 0.1 and 0.15 ohm, respectively. At the far end, the voltage is 200 Volt and the current is 100 A at a power factor of 0.8 leading. At the mid-point, there is a load with a current of 100 A at a power factor of 0.6 lagging. All power factors are with reference to the voltage at load point. Calculate:
- The voltage at the mid-point
 - The voltage at sending end
 - The phase angle between the voltages at sending end and far end point
 - Draw the phasor diagram
- (8 Marks)
- C. Two-wire distributor AB is fed from both ends at 250 volt. The total length of feeder is 500 meters and loads are tapped as follows: 100 amperes at C; 100 meters from A and 80 amperes at D; 250 meters from A. The distributor is uniformly loaded at 2 A/meter length from point B to point E at 200 meters from B. The resistance (go and return) per 1000 meters is 1 Ohm. Calculate the current in various sections of the feeder, the minimum voltage and the point at which it occurs in the system. Draw the load current, voltage profile and voltage drop diagrams. (8 Marks)

Q4: (20 Marks)



- A. State the electrical and mechanical considerations for transmission line design. (4 Marks)
- B. Fill in the blanks by inserting appropriate words
- If sag in overhead line increases, tension in the line
 - A ring main distributor fed at one end is equivalent to fed at both ends with equal voltages.
 - The balancer machine connected to the heavily loaded side works as a
 - If the power factor of load decreases, the line losses
 - A shorter string hasstring efficiency than a longer one.
 - The longer the cross arm, thethe string efficiency.
 - If the spacing between the conductors is increased, the capacitance of the line is.....
- (7 Marks)
- C. Two towers having height of 50 meters and 80 meters support a transmission line at a river crossing. The transmission line has a span of 600 meters between the supports. The weight of the conductor is 2 kg/m length, area of cross-section is 2.5 square cm and the breaking stress is 4200 kg/square cm. Assuming that the ice weight is 0.5 kg/m length, find the minimum clearance level and the clearance at mid-way between the supports. The safety factor is 4. Bases of the towers can be considered the water level. (9 Marks)

Good Luck

Course Examination Committee: Prof. Ahmed Refaat

Dr. Doaa Mokhtar

Dr. Hossam A. Abd el-Ghany

Tanta University		Department: Electrical Power and Machine Engineering		Faculty of Engineering
Course Title: Mechanical Engineering		Course Code: MEP 2141	Years: 2 th	
Date: January, 20 – 1 - 2016		Allowed time: 3 hrs Full Marks: 70	No of Pages: 2	
Name: Prof. Dr. Abd-Elnaby E. Kabeel			Final Exam	

Answer the following questions: Assume any necessary assumptions.

Marks
(15)

Question No. 1

a) Define and explain with drawing:

- Surface tension and capillarity.
- Bulk modulus of elasticity of fluid.

b) A 600 MW power plant burns coal 78.6 % C, 5.6 % H₂, 9.3 % O₂, 1.3 % N₂, and 5.2 % S₂. The coal has average moisture and ash fractions of 14 and 11 percent, respectively. This plant operates with thermal efficiency 38.5 %. An analysis of coal gives a higher heating value of 33160 kJ/kg. an orsat analysis of flue gas gives 13.78 % CO₂, 4.49 % O₂ and 0.75 % CO and refuse coal is 0.1195 kg/kg_f.

Find:

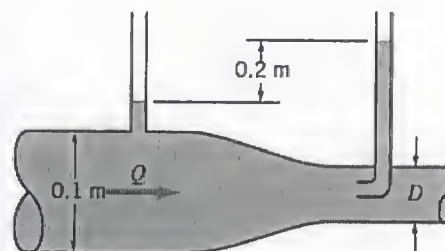
- 1) The coal rate.
- 2) The capacity of forced draught fan, in kg/s if the atmosphere conditions are 50 °C, 0.942 bar, and relative humidity of 50 %.
- 3) The capacity of induced fan in kg/s, if the exhaust gas is at 288 °C and 0.891 bar.
- 4) The size of the motors required to driving the f-d and i-d fans in hp, if there is a 63 cm water difference across each unit and mechanical efficiency of each fan 89 %.

Question No. 2

(12)

a) Draw and classify all pressure measuring devices.

b) Water flows through the pipe contraction shown in Fig. For the given 0.2-m difference in the manometer level, determine the flow rate as a function of the diameter of the small pipe, D.

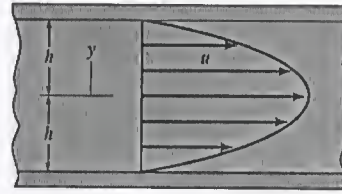


Question No. 3

(13)

- An R-22 refrigeration system works between pressure limits 1.4 bar and 9.6 bar respectively. The refrigerant vapor leaves the evaporator in the saturated vapor state. The condensate leaves the condenser in just saturated liquid state. Find COP of the system.
- The velocity distribution for the flow of a Newtonian fluid between two wide, parallel plates is given by the equation

$$u = \frac{3V}{2} \left[1 - \left(\frac{y}{h} \right)^2 \right]$$



Where V is the mean velocity. The fluid has a viscosity of $0.04 \text{ Pa} \cdot \text{s}$. When $V = 2 \text{ m/s}$ and $h = 0.1 \text{ m}$ determine: (a) the shearing stress acting on the bottom wall, and (b) the shearing stress acting on a plane parallel to the walls and passing through the centerline (midplane).

Question No. 4

(10)

A centrifugal pump deliver $0.2 \text{ m}^3/\text{s}$ discharge of the water from suction reservoir in to delivery reservoir. The static suction head 5 m below the atmospheric pressure and static delivery head 18 m above the atmospheric pressure. Diameter of suction and delivery pipe is 20 cm and length of suction pipe 5.5 m and length of delivery pipe is 20 m . the friction factor of pipe material 0.04 . Determine the shaft power input to the pump. Given pump efficiency 0.86 .

Question No. 5

(10)

Find the critical radius of insulation for the pipe with the outer diameter 7 cm surrounded by asbestos $K = 0.181 \text{ W/m}^\circ\text{C}$ and exposed to air at a temperature of 10°C with $h = 3.5 \text{ W/m}^2^\circ\text{C}$. Also, find the heat losses from the pipe at 275°C for the following cases:

- Pipe with the critical radius of insulation.
- Pipe without insulation.
- Pipe with the critical radius of insulation + 1.5 cm thick insulation.
- Pipe with the critical radius of insulation – 1.5 cm thick insulation.

Question No. 6

(10)



The clearance volume of an air compressor is 6% of the stroke volume. The pressure and temperature of the air during the suction stroke is 0.965 bar and 32°C respectively, and delivery pressure is 6.2 bar . The compressor has a bore of 120 mm a stroke of 152 mm . The compression and re-expansion curves follow the law $PV^{1.25} = \text{constant}$, and the atmosphere air conditions are 1.013 bar and 15.5°C . Determine

- The volumetric efficiency
- The work done per kg of air.

Good luck. Prof. Dr. Abd-Elnaby E. Kabeel

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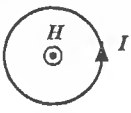
	Tanta University Faculty of Engineering Electrical Power and Machines Engineering Dept.	
Final Exam – First Semester 2015-2016		
Course: EPM2104/EPM2141(Electromagnetic Fields)		Time allowed: 3 hr
Year: 2 nd Electrical Power/Communications		Date: 27/1/2016
No. of Pages: 4		Total Score: 85

Remarks: Attempt to solve all of the following questions

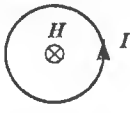
Question 1	10 Points
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Choose the correct answer for the following statements: (Verification of your choice is A MUST when numerical data are given)

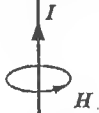
- (1) Plane $z = 10$ m carries charge 20 nC/m^2 . The electric field intensity at the origin is
 (a) $-10a_z \text{ V/m}$ (b) $-18\pi a_z \text{ V/m}$ (c) $-72\pi a_z \text{ V/m}$ (d) $-360\pi a_z \text{ V/m}$
- (2) Point charges 30 nC , -20 nC , and 10 nC are located at $(-1,0,2)$, $(0,0,0)$, and $(1,5,-1)$, respectively. The total flux leaving a cube of side 6 m centered at the origin is:
 (a) -20 nC (b) 20 nC (c) 10 nC (d) 30 nC
- (3) A potential field is given by $V = 3xy - 5y$. Which of the following is not true?
 (a) The potential difference between point $(2, -1, 4)$ and point $(2, -1, -4)$ is zero.
 (b) At point $(1, 0, -1)$, E vanish.
 (c) The electric field at $(2, -1, 4)$ is $3a_x - a_y \text{ V/m}$.
 (d) The potential at $(0, 1, 0)$ is -5 V .
- (4) Which is not an example of convection current?
 (a) Electric current flowing in a copper (b) A beam of moving charges
 (c) Electronic movement in a vacuum tube (d) An electron beam in cathode ray tube
- (5) The relaxation time of a material having $\sigma = 10^{-17} \text{ mho/m}$ and $\epsilon_r = 5$ is
 (a) 5×10^{-10} seconds (b) 10 minutes (c) 15 hours (d) 51.2 days
- (6) A capacitor connected to a battery stores energy twice as much with a given dielectric as it does with air. The susceptibility of the dielectric is
 (a) 0 (b) 2 (c) 1 (d) 3
- (7) Identify the configuration in the figure that is not a correct representation of I and H
 (a) Configuration (b) Configuration (c) Configuration (d) Configuration



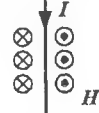
(1)



(2)



(3)



(4)
- (8) Two parallel wires carry currents along the same direction. The force experienced by one due to the other is
 (a) Perpendicular to the lines and (b) Parallel to the lines
 (c) Perpendicular to the lines and repulsive (d) Zero
- (9) The flux through each turn of a 100-turn coil is $(t^3 - 2t) \text{ mWb}$, where t is in seconds. The coil induced emf at $t = 2$ second is
 (a) 1 V (b) -1 V (c) 4 mV (d) -4 mV
- (10) Identify which of the following expressions is (are) not Maxwell's equations for time-varying fields:
 (a) $\nabla \cdot J + \partial \rho_v / \partial t = 0$ (b) $\nabla \cdot E = -\partial B / \partial t$
 (c) $\nabla \cdot D = \rho_v$ (d) $\oint H \cdot dl = \int (\sigma E + \epsilon \partial E / \partial t) \cdot ds$

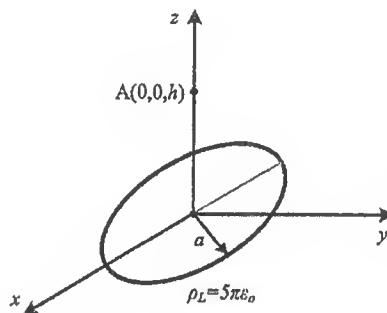
Question 2**10 Points**State true (✓) or false (×) and **correct the false statements**

- (1) Both ϵ_0 and χ_e are dimensionless.
- (2) The electric flux density on a spherical surface $r = b$ produced by a point charge Q located at the origin is the same as that produced by a charge of the same value as Q but distributed over the surface $r=a$ where $a < b$.
- (3) Inside a conductor, the electric field intensity is changes with the position.
- (4) A conductor is an equipotential body.
- (5) For a free-charged dielectric-dielectric interface, the tangential components of the electric flux density in the two materials are equal.
- (6) Faraday's law states that the line integral of the tangential component of H around a closed path equals the net current enclosed by the path.
- (7) An isolated magnetic pole exists.
- (8) The magnetic vector torque (T) on a current loop placed in a magnetic field is the vector product of its magnetic moment m and the magnetic flux density B .
- (9) For any solid cylindrical conductor, the magnetic field inside the conductor does not contribute to its total inductance.
- (10) Sometimes a voltage is induced across a conductor when it remains absolutely stationary within a steady magnetic field.

Question 3**15 Points (1,3,3,[2,2,2,2])**

A circular ring of charge with radius a lies in free space in the $z = 0$ plane, centered at the origin and has a uniform charge density of ρ_L C/m.

- (a) What is the total charge of the ring
- (b) Find the electric field intensity at point $A(0,0,h)$
- (c) Find the electric potential at point A
- (d) For $\rho_L = 5\pi\epsilon_0$ C/m and $a = 4$ m. Calculate:



- (i) The magnitude of electric field intensity at point $P_1(0,0,3)$
- (ii) The force acting on a unit positive-charge placed at $P_2(0,0,-3)$
- (iii) The work-done needed to move a unit positive charge from point P_1 to point P_2
- (iv) If a point charge Q_1 is located at the origin, Find the value of Q_1 which produce the same field intensity of the ring at point P_1

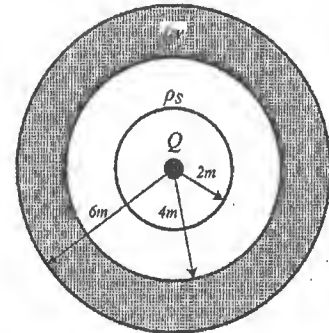
Question 4**15 Points (3,[4,2],[3,3])**

(a) Starting with Gauss's law, deduce an expression for electric field intensity of a point charge

(b) Consider the following charge distribution:

- a point charge of $10\mu\text{C}$ is located at $r = 0$, and
- a uniform surface charge density of $-1\mu\text{C}/\text{m}^2$ at $r = 2$

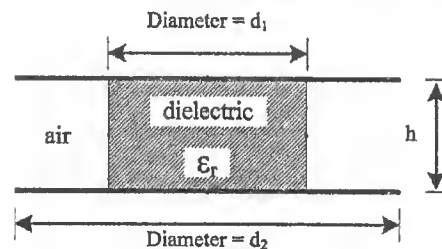
- (i) Calculate the electric flux density D at $r = 1$, and $r = 3$
- (ii) What uniform volume charge density should be established in the region $4 < r < 6$ for D to vanish at $r = 7$.



(c) For the capacitor shown in the Figure.

Find expressions for the following

- (i) the capacitance
- (ii) the energy density in each region

**Question 5****16 Points (2,4,4,2,2,2)**

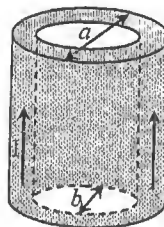
An infinitely long straight filament carries current of (I) lies in free-space along z -axis.

- (a) Use Ampere's law to obtain the magnetic field intensity and the magnetic flux density at point $(0, 4 \text{ meters}, 0)$.
- (b) Determine the force exerted on the filament if the area surrounding it has a magnetic flux density of $\vec{B} = \hat{a}_x - \hat{a}_y \text{ T}$.
- (c) Determine the mutual inductance between the filament and a single turn rectangular coil of sides a and b placed on the x - z plane with the one of the b sides lies along the x -axis between the points $(x_0, 0, 0)$ and $(x_0 + b, 0, 0)$.
- (d) If the filament current varies sinusoidally with time as $I_m \sin(\omega t)$.
- (i) Find the emf induced in the coil as well as the integral of the produced motional electric field dot $d\vec{l}$ along the turn perimeter.
- (ii) Write the appropriate Maxwell's equation for the previous case in the integral form. Hence derive its differential form in not more than three steps of answer.
- (iii) If the relative permeability of the medium surrounding the filament is 50 and the filament carries a dc current I , determine the magnetic polarization (magnetization).

Question 6**19 Points ([7,2,2],[2,6])**

(a) Consider an infinite length hollow conducting tube of conductivity σ_1 S/m carrying a current I with a uniform current density as shown in the figure.

(i) Apply Ampere's law to derive expressions for the magnetic field intensity everywhere and sketch the results as a function of the radius r



(ii) Derive a formula for the resistance per unit length of the tube

(iii) The space $0 < r < b$ is now filled with a conducting material whose conductivity is σ_2 S/m. Current I in Ampere, flows through the area $0 < r < a$ with a constant current density. Derive a formula for the voltage drop across each unit length of the filled tube

(b) A point charge of $4\pi\epsilon_0$ mC is located at point (10,-1,1) in Cartesian coordinates in the presence of a perfectly conducting plane located at $z=0$ in free space.

(i) Sketch the image equivalence and the electric field lines

(ii) Calculate the electric field intensity, the electric potential and the surface charge density at (0,0,0).

Wish you all the best

Prof. Ahmed I. Shobair and Dr. Sherif Dabour

استخدم مقرر دراسات بيئية
الفئة الثانية (الامتحان قديم)
الزمن: ساعة

يوليو ٢٠٠٧

جامعة طنطا
كلية الهندسة
قسم هندسة إلكترونيات
قسم الاتصالات الكهربائية

أجب عن الأسئلة التالية:

- ١- أذكر أهم مصادر التلوث بالموجات الكهرومغناطيسية والآثار السلبية الناتجة عنه مثل هذا النوع من التلوث.
- ٢- أكتب عن الطرق المختلفة لتوليد الطاقة الكهربائية وقاربه فيما بين هذه الطرق فيما يخص استغلال الموارد البيئية والتلوث البيئي المصاحب لكل وحدة من المنتج.
- ٣- أذكر الاستراتيجيات البيئية الخاصة بإقامة محلات توليد المحول.
- ٤- أكتب مذكرة واحدة عن مصادر الطاقة الجديدة والمتجددة.
- ٥- أكتب مذكرة واحدة عن طرق رفع كفاءة استخدام مصادر الطاقة التقليدية لضمان استدامة الموارد البيئية المتجددة في إنتاجها.
- ٦- أكتب مذكرة واحدة عن معامل القدرة وتأثيراته وطرق تحسينه ومردود ذلك على ترسيده وحمل استغلال الطاقة الكهربائية.
- ٧- أكتب مذكرة واحدة عن المجالات الكهرومغناطيسية الناتجة عن المحولات والمعدات الثقيلة ومخطوط نقل الطاقة الكهربائية مع إعطاء أمثلة.
- ٨- اشرح مخطط يوضح تسلسل العمليات في محطة توليد الطاقة الكهربائية باستخدام الطاقة النووية وماهي أهم المميزات باستخدام الطاقة النووية لتوليد الطاقة الكهربائية.

TANTA UNIVERSITY
Faculty of Engineering
 Power Engineering and Electrical Machines Department

Course : Electromagnetic fields
 Code : EPM2104
 Year : 2nd
 Date : 15 / 1 / 2007

Exam : Final
 Time : 3 Hours
 Department : Power Engineering
 & Electrical Machines

Answer All Questions:

Question(1)

- a) Using Gauss's law, Derive the electric flux density due to a uniform line charge distribution ρ_l C/m lying along the z axis and extending from $-\infty$ to $+\infty$.
- b) Determine the electric field intensity E at point $P(2,0,0)$ due to three standard charge distribution
 - i) A uniform surface charge at $x = -2$ m with $\rho_s = -0.2$ nC/m².
 - ii) A uniform surface charge at $x = 5$ m with $\rho_s = +0.2$ nC/m².
 - iii) A uniform line charge at $x = 8$ m with $\rho_l = 4$ nC/m

Question(2)

- a) Derive the two characteristics of the relationship between potential difference V and electric field intensity E at any point. Also write down the voltage gradient equation in spherical coordinates.
- b) For the potential field $V = 2x^2y - 5z$ in free space, evaluate at point $P(-4,3,6)$
 - i) The potential
 - ii) The magnitude and direction of the electric field intensity
 - iii) The electric flux density
 - iv) The volume charge density

Question(3)

- a) Aided with sketches derive the boundary conditions at surface separating two dielectrics having permittivities ϵ_1 , ϵ_2 . Derive the relation between electric field intensities E_1 and E_2 and electric flux densities D_1 and D_2 in terms of θ_1 , ϵ_1 , ϵ_2 , and θ_2 .
- b) Find the relative permittivity of the dielectric material used in a parallel plates capacitor if
 - i) The capacitance, $C = 40$ nF, separation distance, $d = 0.1$ mm, and surface area, $S = 0.15$ m²
 - ii) Electric field intensity, $E = 500$ kV/m, and $\rho_s = 10$ μ C/m²
 - iii) Electric flux density, $D = 50$ μ C/m² and the energy density is 20 J/m³

Question(4)

- a) Using Ampere's circuital law derive mathematical expressions for the magnetic field intensity H from $\rho = 0$ to $\rho = \infty$ of an infinitely long coaxial transmission line carrying a uniformly distributed total current I in the inner solid conductor and $-I$ in the outer hollow conductor, given that the inner solid conductor radius is a and the hollow outside conductor inner radius is b and its outer radius is c , where $a < b < c$. Sketch H versus ρ from 0 to ∞ .
- b) A filamentary conductor carries current of 10 A is directed from infinity to the origin along the positive x axis and then back out to infinity along the positive y axis. Use Biot-Savart law to find the magnetic field intensity H at $P(0,0,1)$.

TANTA UNIVERSITY

Faculty of Engineering [Final Exam. Jan. 2006-2007]

Course: Energy Conversion

2nd Year (Dept. Electric Power & Machines Eng.)

Time: 3 hours

ملاحظات هامة: لاحظون عن أي من ملامح يقيمتها (المعروفة) من أترك الأجوبة بدلا منها

الفرصة موزعة أو قيمتها لا تعطي لم تترك وننتجها

وضح اجابك بشكل توضيحي مرسومة بها به ومعادلات كما أمكن ذلك

من فضلك لاحظ ان درجات الأسئلة مختلفة

Question 1

a. For the machine shown in Fig. 1, derive an expression for the mutual inductance between the two windings taking the fundamental component of stator flux density

(10 points)

b. For a slotted armature: i) sketch the flux lines in a slot. Show that there is little force on conductors in slots. ii) show that there is a strong force exerted on the iron teeth by deriving an expression for the mechanical torque applying the principle of conservation of energy. For this purpose, assume no change in stored energy and no electrical or mechanical losses.

(5 points)

Questions 2

Fig. 2 shows a section of a machine having two identical stator windings aa' , bb' , in quadrature. The self inductance of the each stator winding is L_{ss} and the rotor winding is L_{rr} and they are constants independent of θ . The mutual inductance between a stator winding and the rotor winding is a function of the angular position of the rotor as follows: $M_{ar} = M \cos \theta$; $M_{br} = M \sin \theta$, where M is the maximum value of the mutual inductance. The rotor winding is excited with dc I_f . The rotor is revolving at a synchronous speed so that its instantaneous angular position is given by $\theta = \omega t - \delta$. The resistance of each of the stator phases is r and that of the field winding is r_f . Derive expressions for the open circuited terminal voltage of each coil in terms of the given data.

Question 3

a. Draw a developed sketch of winding that produce a pulsating mmf in rotating machine. Show by equations that such mmf can be decomposed into two rotating mmf's.

(5 points)

b. Derive an expression for the torque developed by a cylindrical synchronous motor having two poles similar to that shown in Fig. 2 but without the winding bb' . The rotor windings are excited with dc current I_a , while the stator winding is connected to an ac source with current $i_a = \sqrt{2} I_m \cos \omega t$. L_{ss} and M_{ar} may be assumed as in question 2.

(i) Write an expression for the energy stored in terms of ω and angular position θ .
(ii) What is the rotor speed ω , at which an average torque will be produced?
(iii) Find the average torque.

(15 points)

Question 4

a For a singly-excited translational system, derive expressions for current, flux linkage, force in the form of stored energy or coenergy. (15 points)

b Show that the energy stored in a rotating magnetic system given by $W_m(\lambda, \theta) = \int_0^\lambda i(\lambda, \theta) d\lambda$, regardless of how λ varies with θ . Hint: Integrate $d\lambda$ over a two-section path: one with $\lambda = 0$ and the other with $\theta = \text{constant}$. (5 points)

c Prove an expression for the differential force that acts on a current carrying conductor of differential length dl placed in a magnetic field of density B tesla. (5 points)

Question 5

a State with illustrations three different types of the collectors used with applications of solar electric energy. (10 points)

b Draw a sketch of a domestic application that uses solar heat energy. (10 points)

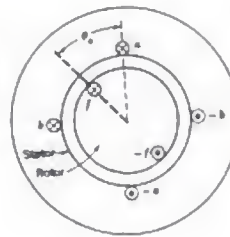
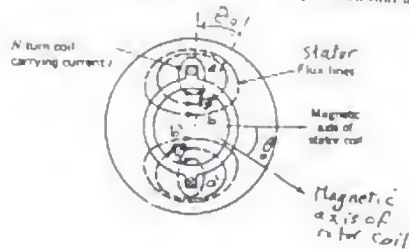


Fig. 2

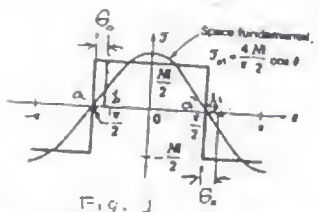


Fig. 1

END OF EXAM

LUCK <GOOD> BYE

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3819-3820, 3821-3822, 3823-3824, 3825-3826, 3827-3828, 3829-3830, 3831-3832, 3833-3834, 3835-3836, 3837-3838, 3839-3840, 3841-3842, 3843-3844, 3845-3846, 3847-3848, 3849-3850, 3851-3852, 3853-3854, 3855-3856, 3857-3858, 3859-3860, 3861-3862, 3863-3864, 3865-3866, 3867-3868, 3869-3870, 3871-3872, 3873-3874, 3875-3876, 3877-3878, 3879-3880, 3881-3882, 3883-3884, 3885-3886, 3887-3888, 3889-3890, 3891-3892, 3893-3894, 3895-3896, 3897-3898, 3899-3900, 3901-3902, 3903-3904, 3905-3906, 3907-3908, 3909-3910, 3911-3912, 3913-3914, 3915-3916, 3917-3918, 3919-3920, 3921-3922, 3923-3924, 3925-3926, 3927-3928, 3929-3930, 3931-3932, 3933-3934, 3935-3936, 3937-3938, 3939-3940, 3941-3942, 3943-3944, 3945-3946, 3947-3948, 3949-3950, 3951-3952, 3953-3954, 3955-3956, 3957-3958, 3959-3960, 3961-3962, 3963-3964, 3965-3966, 3967-3968, 3969-3970, 3971-3972, 3973-3974, 3975-3976, 3977-3978, 3979-3980, 3981-3982, 3983-3984, 3985-3986, 3987-3988, 3989-3990, 3991-3992, 3993-3994, 3995-3996, 3997-3998, 3999-4000, 4001-4002, 4003-4004, 4005-4006, 4007-4008, 4009-4010, 4011-4012, 4013-4014, 4015-4016, 4017-4018, 4019-4020, 4021-4022, 4023-4024, 4025-4026, 4027-4028, 4029-4030, 4031-4032, 4033-4034, 4035-4036, 4037-4038, 4039-4040, 4041-4042, 4043-4044, 4045-4046, 4047-4048, 4049-4050, 4051-4052, 4053-4054, 4055-4056, 4057-40

العرفة الثانية حاسبات-اتصالات-قوى كهربائية (قديم)

المادة : تحليل الدوائر الكهربائية

الزمن : ثلاث ساعات يناير ٢٠٠٧

جامعة طنطا - كلية الهندسة

قسم هندسة الحاسبات والتحكم الآلي

امتحان الفصل الدراسي الأول للعام الجامعي ٢٠٠٦ / ٢٠٠٧

Answer the following six questions:

Q(1): For the circuit in Fig. Q1

a) Prove that $V_o = \frac{R_b}{R_a} (V_b - V_d)$ when $\frac{R_a}{R_b} = \frac{R_c}{R_d}$

b) For $\frac{R_a}{R_b} = \frac{R_c}{R_d} = \frac{1}{5}$, $V_b = 4.0$ V and $V_{cc} = 10$ V,

what range of values for V_d will result in linear operation?

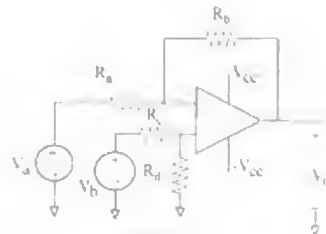


Fig. Q1

Q(2): The voltage pulse described by the following equations is impressed across the terminals of $0.5 \mu\text{F}$ capacitor:

$$V(t) = 0 \quad t \leq 0$$

$$V(t) = 4t \quad 0 \leq t \leq 1$$

$$V(t) = 4e^{-(t-1)} \quad 1 \leq t \leq \infty$$

- Derive the expressions for the capacitor current, power, and energy.
- Specify the interval of time when energy is being delivered by the capacitor.

Q(3): a) Deduce the current response for an RL circuit with step voltage source.

b) The current source in the circuit generates the current pulse shown in Fig. Q3.

There is no energy stored at $t = 0$.

1- Derive the numerical expressions for $v(t)$ for the

time intervals $t < 0$, $0 < t < 40 \mu\text{s}$, and $40 \mu\text{s} < t < \infty$

2- Calculate $v(60 \mu\text{s})$ and $v(60^+ \mu\text{s})$

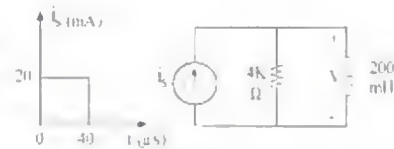


Fig. Q3

Q(4): The switch in the circuit shown in Fig. Q4 has been in position **a** for a long time,

At $t = 0$ the switch is thrown to position **b**. Find

a) V_c for $t \geq 0$

b) $i(t)$ for $t \geq 0^+$

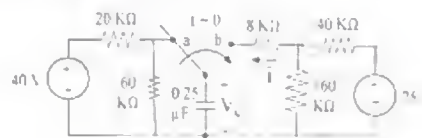


Fig. Q4

Q(5): The uncharged capacitor in the circuit shown in Fig. Q5 is initially switched to terminal a of the three position switch. At $t = 0$ the switch is moved to position b, where it remains for 20 ms. After the 20 ms delay, the switch is moved to position c, where it remains indefinitely.

- Derive the numerical expression for the voltage across the capacitor.
- Plot the capacitor voltage versus time.
- When will the voltage on the capacitor equal 200 V ?

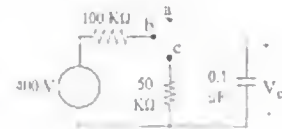


Fig. Q5

Q(6): The initial energy stored in the circuit in Fig. Q6 is zero. At $t = 0$, a dc current source of 24 mA is applied to the circuit

- What is the initial value of I_L and dI_L/dt ?
- What is the numerical expression for $I_L(t)$ when $t \geq 0$?

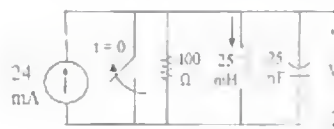


Fig. Q6

Answer the following questions :-

1-a) Consider the one – dimensional heat equation $u_t = u_{xx}$, $0 \leq x \leq 1$, $t \geq 0$
with the boundary conditions $u(0,t) = 0$, $u_x(1,t) = 1$

Compute the first two rows of the solution if $h = \frac{1}{3}$, $k = \frac{1}{18}$

and the initial condition $u(x,0) = x$.

1-b) Use Euler's method to find y' at $x=0.2$, 0.4 , if $y'' = 4y y' + x y$, $y' = 2$
and $y' = 1$ at $x=0.1$.

2-a) Evaluate $\int_1^{5/2} \ln x \, dx$ correct to 6 decimal by using Simpson's rule .

2-b) Find $f(0.7)$ from the following readings

x	0.4	0.6	0.8	1
y	0.3799	0.537	0.664	0.7616

3-a) Fit the curve $y = a + bx$ to the readings

x	0.5	1.0	1.5	2.0	2.5	3.0
y	0.31	0.82	1.29	1.85	2.51	3.02

and find the root mean square of the errors .

3-b) Use the simple iteration method to obtain the smallest positive root
of the equation $x^4 - 8x + 5 = 0$ correct to five decimal places .

3-c) By the use of Gauss – Seidel method solve the system of linear equations
 $5x_1 - x_2 + 3x_3 = -2$, $x_1 + 5x_2 - 2x_3 = 10$, $2x_1 - 4x_2 + 10x_3 = 6$

4-a) To what degree of accuracy can we calculate $\sqrt{115}$ by means
of Lagrange's interpolation formula for the function $y = \sqrt{x}$ if we choose
the interpolation $x_0 = 100$, $x_1 = 121$, $x_2 = 144$?

4- b) From the following table , find the number of students who obtained less than 45 marks

Marks	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
No. of St	31	42	51	35	31

المادة : الاقتصاد الهندسي	المقابلة الشفوية لدراسة الأول	ليه الهندسة
السنة : الثانية (عابيات وإقتصاديات)	٢٠٠٦ / ٢٠٠٥	ماعه هنا
الزمن : ساعة	١٠ / ١٥	د/ التفاضل والتكامل

جيب لعداء سئله الذئبه :-

السؤال الأول

- اذكر العناصر المطلوبة لإتمام منشأه صناعية ؟
- اشرح دائرة الإنتاج ؟
- اشرح مع الرسم تانومر العوائد المتناقصه ؟
- عامل يتأخر ١٢ جنيه لكل ساعة تقاد إنتاج ٢٥ قطعة بالساعة على آلة تبلغ تكلفه ١٠٠ جنيه بالساعة فإذا زاد عامل آخر اتى تفوقا به الأول بمقدار ١٨ جنيه
- ما هو التكاليف الكلية للقطعة الواحدة من كونا الى لنته ثم احب التكاليف المتغيرة بالمثل على ثلاث نيتي موا قطعة بالساعة وما هو نقاط التوازن عند استنتاجها .

السؤال الثاني

- اذكر ما تعرفه من الطيف والعمود المرونة ؟ ثم رفق العزم بين حدوده الطيف ورونة العزم ؟
- اشرح مع الرسم مفهوم الخدر والخط ؟
- ما هو المبلغ الذي يجب ايداعه من ١ يناير ١٩٨٤ لكل ١٠٠٠ دولار لمدة ٥ سنوات حتى ١ يوليو ١٩٩٢ كمن يتم سحب ١٠٠٠ جنيه كل ١٠ سنوات لمدة ٥ سنوات بتأخر ١٠ يناير ١٩٩٣ ٩ الربيع الدسم هو ١١ % على التركيب لوقت السوف ؟ اشرح الفانومر
- ما هو المبلغ الذي يتم الجدول منه اعزى من الملة ؟

السؤال الثالث

- اذكر فوائدها حساب التكاليف ؟ ثم رفق الرسم عناصر التكاليف ؟
- اشرح مع الرسم طريقة التقاوت ؟
- اقدم صنف ما يبلغ ٢٥٠٠٠ جنيه بفائده لبيعه تدريجا ١٥ % سنويا وانفق على الدائم على مداها فلول خمس سنوات والمطلوب تدعيم خلوها السداد مستمدا كمرور - طرفه مختلف ؟

TANTA UNIVERSITY

Faculty of Engineering

Dept. of Computer & Control Eng

Course: Electrical Machines

2nd Year

Time: Three hours

FINAL EXAM. 2005-2006

Question 1

- a) Explain how is eddy-current loss in transformers affected by magnitude and frequency of the applied voltage. How can it be minimized?
- b) By giving reason(s) مع ذكر الاسباب لتدعيم الاجابة mention what will happen the machine laboratory when the mechanical load is removed completely while a dc series motor is running.
- c) Aided with ONE equation ONLY, suggest three methods for speed control of dc motors. State the effect(s) of varying each parameter the speed. غير مطلوب اي رسومات
- d) Using a variable frequency source to control the speed of a three phase induction motor, if the voltage is kept constant, what will be the effect on the machine flux? What is (are) the limitations of frequency reduction? Verify your answer with equation(s).
- e) Draw ONLY diagram(s) to show how the direction of rotation of a squirrel-cage induction motor can be reversed.
- f) Draw coil connection diagram(s) of a three phase induction motor to show how the number of poles can be changed. What effect does this have on the operating speed.
- g) Suppose that, for a given excitation and load, a synchronous motor draws a unity pf current. The load is then kept constant while excitation is increased. Aided with a phasor diagram, discuss the change in the power factor and armature current.
- h) Aided with illustration(s), explain the basic construction and principle of operation of a selsyn.
- i) Aided with illustration(s), explain three applications of linear motors.

Question 2

The parameters of the equivalent circuit of a 150 kVA, 2400 V/240 V transformer, are $r_1 = 0.2 \text{ Ohm}$, $r_2 = 2 \text{ Ohms}$, $x_1 = 0.45 \text{ Ohm}$, $x_2 = 4.5 \text{ Ohms}$, $R_c = 10 \text{ k. Ohms}$, $X_m = 1.55 \text{ k. Ohms}$. Using the approximate equivalent circuit referred to the primary, determine the (a) vol

regulation and the efficiency of the transformer operating at rated load with 0.8 lagging power factor.

Question 3

In a long-shunt compound generator, the terminal voltage is 230V when generator delivers 150A. Determine i) the induced e.m.f. ii) total power generated iii) distribution of this power, given that: shunt field series field, diverter and armature resistances are 92, 0.015, 0.03 and 0.032 Ohms respectively.

h) A 250- V, dc shunt motor draws a full-load line current of 100 A at the rated speed of 1200 r/min. The armature circuit resistance R_a is 0.1 ohm and the field winding resistance is 250 ohm; Determine (a) the gross full-load mechanical power output, (b) the electromagnetic torque developed at full load, and (c) the speed regulation, if the no load armature-winding current is 10 A.

Question 4

A 2300-V, 3-phase, wye-connected, round-rotor synchronous motor has $x_s = 2$ Ohm per phase and $R_a = 0.1$ Ohm per phase. The motor operates at 0.866 leading power factor while taking a line current of 350 A. Find the rms value of the induced phase voltage, the power angle, and the developed and maximum torque.

Question 5

A 3-phase slip-ring motor has negligible stator-winding resistance, the total leakage reactance referred to the rotor being 5 Ohms per phase and the rotor-winding resistance 0.45 Ohm per phase. When running with slip rings short-circuited and exerting full load torque the slip is 3%. Determine (i) the external rotor resistance per phase to give full load torque at starting, and (ii) the external rotor resistance per phase to give a stable speed of 50% of synchronous speed with a torque of 50% of full load torque.

END OF EXAM

LUCK ◀GOOD▶ BYE

Tanta University

Final Exam First Term (2006-2007)
(الامتحان النهائي - الفصل الأول)

Dep. of Phys. Math
Eng.

Faculty of Engineering
Second Year Students
Second Elec.

Date of Exam : 28/1/2007
January 2007
Engineering Mathematics

Time : 3 hours

Answer the following questions :

1- a) Discuss the continuity of the function $f(z) = \begin{cases} \frac{\operatorname{Re}(z)}{1+|z|} & , z \neq 0 \\ 0 & , z = 0 \end{cases}$ at $z = 0$.

b) State the polar form of Cauchy Riemann equations and then prove that $\frac{d}{dz}(z^n) = nz^{n-1}$.

c) Show that $u(x,y) = e^x \cos y$ is a harmonic function in the whole plane, find a harmonic conjugate $v(x,y)$ of $u(x,y)$ such that $w = u + iv$ is analytic.

2- a) State without prove Cauchy integral theorem. Give an example to show that $\oint f(z)dz = 0$ while $f(z)$ is not analytic inside C .

b) Evaluate $\int \frac{\sin z}{z^4} dz$, $\int \frac{3z^2+2}{(z-1)(z^2-9)} dz$, $C: |z-2|=3$, and $\int_{-2}^2 \frac{z-1}{z(z-2)(z-4)} dz$.

c) Evaluate $(1+i)^{1/2}$ is the sum of the result roots equal zero?

3-a) Find a series solution for the differential equation $4xy'' + 2y' + y = 0$.

b) Prove that $\Gamma(\frac{1}{2}) = \sqrt{\pi}$, $J_1(x) = \sqrt{\frac{2}{\pi}} \sin x$.

c) Evaluate $\int_0^{\infty} x^n (\ln x)^n dx$, $\int_0^{\pi} \sin^3 \theta d\theta$.

4) a) Prove that Laplacian operator in the spherical polar co-ordinates take the form

$$\nabla^2 f = \frac{1}{r^2} \frac{\partial}{\partial r} \left(r^2 \frac{\partial f}{\partial r} \right) + \frac{1}{r^2 \sin \theta} \frac{\partial}{\partial \theta} \left(\sin \theta \frac{\partial f}{\partial \theta} \right) + \frac{1}{r^2 \sin^2 \theta} \frac{\partial^2 f}{\partial \phi^2}$$

b) Reduce the Laplace equation in spherical polar co-ordinates into three ordinary differential equations.

د. أحمد سالم إبراهيم

With my best wishes

انتمت الأسئلة

- ١- 1.) Write the methods which used for measuring the active power in three phase circuit.
 2.) Explain the suitable one of them for measuring the input power for unsymmetrical, three phase, star connected, inductive load.
 3.) Explain how one can be measure the total reactive power of a three phase, symmetrical, delta connected, capacitive load.

- ٢- 1.) The transmission lines can be classified into; short, medium and long lines. Explain how can be calculated the performance of II- model line, in the laboratory.
 2.) If the results of the following table represents an actual measurement for medium line at full load. Calculate the line parameters (Z, R, X), efficiency and regulation. Use the II-model and assume $\Delta V = V_s - V_r$, $I_l = I_r$ from the table.

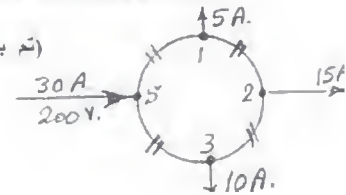
I_s (A)	V_s (v)	P_s (w)	I_r (A)	V_r (v)	P_r (w)
10,5	227	2220	10	220	1905

- ٣- 1.) A d.c. ring distribution network has three loads. It is simulated in the laboratory by its equivalent circuit. Describe how determination the performance of this network at full load (i.e all loads are on the full ratings).
 2.) For a 2-wire ring line, shown in Fig.1, the measuring of sending current and voltage are 30 A. & 200 v., the load currents at points 1, 2, 3 are 5 A., 15 A., 10A. respectively. The resistance of line sections are equal (i.e $R_{s1} = R_{12} = R_{23} = R_{3s}$) and each section (go and return) has 0.1Ω . Find: (a) the current and power loss in its section.
 (b) the voltage of the nodes 1, 2, 3.

- ٤- Explain how can study the potential distribution over a string of suspension insulator has four units in the laboratory, don't use a guard ring. If $E_{ph} = 220$ Kv, $m = 0.1$, $f = 50$ Hz, $C = 0.01 \mu F$. Calculate the potential across the four insulation units and the maximum leakage current.

(تم بحمد الله والحمد لله رب العلمين)

Fig.1



ANSWER THE FOLLOWING QUESTIONS:

- 1-a) Sketch the power-flow diagram for a DC motor and for a DC generator (label all losses) . Also, discuss with a suitable drawing the manual starter for a DC shunt motor.
- b) A 15 hp, 240 V, 1840 r.p.m shunt motor draws 52 A when operating at rated conditions. The resistance of the shunt field windings is 120 Ω , and the resistance of the armature is 0.4 Ω , Determine the no-load speed, assuming the total losses at no-load is 960W

- 2-a) Show with the aid of suitable drawing the steady state speed and torque characteristics for shunt, series and compound motors.

- b) A 100 hp, 650 r.p.m, 240 V series motor has an efficiency of 89.6 % when operating at rated conditions. The series field has 15 turns / pole and the equivalent demagnetizing mmf due to armature reaction is approximately 4 % of the series mmf. The motor parameter are:

	Armature	Interpole	Series
Resistance, (Ω)	0.0202	0.00588	0.00272

The magnetization curve for the motor has the following characteristics

MMF (AT / pole)	1000	2000	3000	4000	5000	6000	7000
Flux density (T)	0.24	0.50	0.69	0.83	0.90	0.96	1.00

Determine the new speed if the load is reduced to a value that causes the armature current to be 40 % of rated current.

- 3-a) State in detail the procedure for paralleling one DC generator with another that is already on the bus. Include in your statement the instruments observed and the equipment operated.

- b) Three 240 V DC generator are operating in parallel and taking equal shares of a 3000 A, 240 V bus load. The regulations as well as the ratings of the generators are:

Generator	A	B	C
Regulation %	3	4	5
Rated power (Kw)	400	300	200

If the total load drops to 2000 A Determine:

(i) New bus voltage.

(ii) Current supplied by each machine.

P.T.O

- 4-a) Prove that for small DC motors having an output power = P, an efficiency = η and stray losses = 1/3 total losses, the armature power is given by :

$$P_a = P \left(\frac{1 + 2\eta}{3\eta} \right).$$

- b) Find the diameter and length of armature for a DC motor having the following data: armature power, $P_a = 100\text{Kw}$, speed = 900 rpm, Number of poles = 4. The product of specific magnetic and electric loading is related to diameter as follows:

D (m)	0.1	0.2	0.3	0.4	0.5	0.6
Bav.ac	5200	9300	12700	15500	18000	20000

Take ratio of pole arc to pole pitch = 0.86, and select the design which gives a square pole face.

- 5-a) Prove that, for a cylindrical body, the moment of inertia is given by $J = \frac{\pi}{32} \rho D^4 l$, where ρ is the mass density.

- b) A control motor is required to operate from a 36 V DC supply and to provide a torque of 0.8 N.m at 150r.p.s. The armature length is to be twice of armature diameter.
- Estimate the main dimensions of the armature. The average air-gap density = 0.35 Web./m² and amper- conductors per meter = 8000.
 - Assuming that the average density of rotor material is about 6000 Kg/m³, estimate the moment of inertia of the armature. It may be assumed that the moment of inertia of commutator, shaft and overhang is approximately equal to that of cylinder of magnetic material.

GOOD LUCK

Notes: The exam paper consists of three pages (ten questions). Answer all questions
For the exam committee, Please allow steam tables inside the exam theater.

Question No. 1 (Mark is 5% of the total mark):

Define using appropriate sketches: thermodynamic state, thermodynamic process, thermodynamic cycle, closed thermodynamic system and open thermodynamic systems.

Question No. 2 (Mark is 3% of the total mark):

(Choose the correct answer, giving appropriate explanations)
Electric heaters are commonly used for heating purposes. The energy transformed during this heating process is ...??...

- | | |
|----------------------|-----------------------|
| i) Heat energy, | ii) Work energy |
| iii) Internal energy | iv) Both of i and ii. |

Question No. 3 (Mark is 3% of the total mark):

(Choose the correct answer, giving appropriate explanations)
Thermal efficiency of a vapor power plant in the winter is ...??... that in the summer.

- | | |
|-------------------|---------------------------|
| i) equal to, | ii) less than |
| iii) greater than | iv) greater than by unity |

Question No. 4 (Mark is 6% of the total mark):

Consider a refrigerator and a heat pump, both of them taking and rejecting same amounts of heat (Q_m and Q_{out}). choose the correct answer and give appropriate explanations

- a) the coefficients of performance of the refrigerator:
- | | |
|----------------------------------|--------------------------------|
| i) may be greater than unity, | ii) must be greater than unity |
| iii) never be greater than unity | iv) non of the above |
- b) the coefficients of performance of the heat pump:
- | | |
|----------------------------------|--------------------------------|
| i) may be greater than unity, | ii) must be greater than unity |
| iii) never be greater than unity | iv) non of the above |
- c) the coefficients of performance of the refrigerator is ...??... the coefficients of performance of the heat pump:
- | | |
|-------------------|------------------------|
| i) equal to, | ii) less than |
| iii) greater than | iv) less than by unity |

Question No. 5 (Mark is 8% of the total mark):

A simple ideal Brayton cycle is modified to incorporate multistage compression with intercooling, multistage expansion with reheating, and regeneration without changing the pressure limits of the cycle. As a result of these modifications, deduce with appropriate explanations.

- Does the net work output increase, decrease, or remain the same?
- Does the back work ratio increase, decrease, or remain the same?
- Does the thermal efficiency increase, decrease, or remain the same?
- Does the heat rejected increase, decrease, or remain the same?

Question No. 6 (Mark is 5% of the total mark):

Mention five differences between vapor power plants and gas power plants.

Question No. 7 (Mark is 10% of the total mark):

One kg of air undergoes a thermodynamic cycle consisting of three processes.

- **Process 1-2:** compression at constant specific volume
- **Process 2-3:** constant-temperature expansion
- **Process 3-1:** constant-pressure compression

At state 1, the temperature is 300 K, and the pressure is 1 bar. At state 2, the pressure is 2 bars. Applying the ideal gas equation of state,

- sketch the cycle on $p-v$ coordinates.
- determine the temperature at state 2,
- determine the specific volume at state 3, in m^3/kg .

Question No. 8 (Mark is 10% of the total mark):

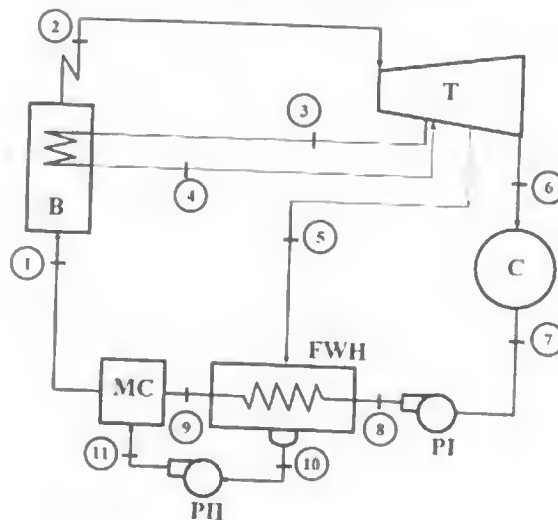
At steady state, a refrigerator whose coefficient of performance is 3 removes energy by heat transfer from a freezer compartment at 0°C at the rate of 6000 kJ/h and discharges energy by heat transfer to the surroundings, which are at 20°C . Determine the power input to the refrigerator and compare with the power input required by a reversible refrigeration cycle operating between reservoirs at these two temperatures

Question No. 9 (Mark is 25% of the total mark):

A steam power plant operates on the reheat regenerative Rankine cycle with a closed feed water heater, as shown in the figure. Steam enters the turbine at 12.5 MPa and 550°C at a rate of 24 kg/s and is condensed in the condenser at a pressure of 20 kPa. Steam is reheated at 5 MPa to 550°C . Some steam is extracted from the turbine at 1.0 MPa and is completely condensed in the closed feed water heater, and then it is pumped to 12.5 MPa before it mixes with the feed water at the same pressure. Assuming an isentropic expansion and compression in both the turbine and the pumps, draw the cycle on a T-S diagram then, determine

- the temperature of the steam at the inlet of the closed feed water heater,
- the mass flow rate of the steam extracted from the turbine for the closed feed water heater,
- the net power output, and
- the thermal efficiency

B : Boiler
T : Turbine
C : Condenser
PI : Pump I
PII : Pump II
FWH : Feed Water Heater
MC : Mixing Chamber



Question No. 10 (Mark is 25% of the total mark):

A gas power plant operates on the regenerative Brayton cycle between the pressure limits of 100 and 1200 kPa. The cycle contains two stages of expansion with inter-reheating and two-stages of compression with intercooling. The working fluid is air. The air enters the first and the second stages of compressions at 300 K and 350 K, respectively, and the first and the second stages of expansions at 1400 K and 1300 K, respectively. Assuming both the compressor and the turbine have an isentropic efficiency of 85 percent and the regenerator has an effectiveness of 80 percent and using constant air specific heat of 1.005 kJ/kg K, draw the schematic diagram for the plant and represent the cycle on a T-S diagram then, determine

- a) the back work ratio and the net work output,
- b) the thermal efficiency.

With best wishes

Dr. Kh. Khodary

Answer the following questions

1-a) Prove that , the necessary and sufficient condition for $f(z)$ to be analytic in a simply connected domain D is $\oint_C f(z) dz = 0$ where C is a closed contour in D .

1-b) Solve the equation $\cos z = 5$

1-c) Evaluate $\oint_{|z|=3} \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz$

1-d) Find the Maclaurine series of $f(z) = \frac{1}{1+z^2}$ and hence find Maclaurine series of $\tan^{-1} z$

1- e) Evaluate $\oint_{|z|=\frac{5}{2}} \frac{z^2 - 2z}{(z+1)^2(z^2+4)} dz$

2- a) Find the series solution of the D. E. $y'' + 4xy' - 8y = 0$. Find the particular solution that passes through the point $(0, 2)$ and having $y' = 0.2$ at this point.

2- b) Find the series solution of the D. E. $4xy'' + 2y' + y = 0$

3-a) Evaluate the following integrals

(i) $\int_0^1 \sqrt{-\ln z} dz$ (ii) $\int_0^\infty t^{\frac{3}{2}} (1 - e^{-t}) dt$

(iii) $\int_0^4 y^2 \sqrt{4-y} dy$ (iv) $\int x^4 J_1(x) dx$

3-b) Express $J_{\frac{3}{2}}(x)$ and $J_{-\frac{3}{2}}(x)$ in terms of $\sin x$ and $\cos x$.

3- c) Prove that , $J'_k = \frac{1}{2} (J_{k-1} - J_{k+1})$

بسم الله الرحمن الرحيم

امتحان، الفصل الدراسي الثاني

جامعة طنطا

الفرقة الثانية، قوى و آلات كهربائية

كلية الهندسة

المادة: خطوط نقل وتوزيع القوى الكهربائية

قسم هندسة القوى والآلات الكهربائية

الزمن: ٣ ساعات

تاريخ الامتحان: ٢٨ / ٥ / ٢٠٠٧

Answer the following questions:

1-A) Derive the A,B,C and D constants for the network consisting of two network in parallel

B) A three phase, 5011z transmission line consists of two circuits connected in parallel with the following constants

$$A_1=D_1=0.9 \angle 1.5^\circ$$

$$A_2=D_2=0.95 \angle 1.2^\circ$$

$$B_1=89.0 \angle 82^\circ \Omega$$

$$B_2=80.0 \angle 84^\circ \Omega$$

$$C_1=0.0005 \angle 90^\circ \text{ mho}$$

$$C_2=0.0008 \angle 90^\circ \text{ mho}$$

Find the A, B, C and D constants of the system. If the line delivers a load of 1100 MW at 0.9 lagging power factor and 132.0 kV, draw the combined sending and receiving end power circle diagram and find -

i) The characteristics at the sending end, the efficiency and voltage regulation

ii) The maximum power transferred, the efficiency and corresponding power factor

iii) The required reactive power at the receiving end in order to maintain both the sending and receiving end voltages equal to 132.0 kV for load of 1100 MW and 0.9 lagging power factor

2-A) Explain, Disadvantages of low power factor

B) A generating station supplies power to the following -
lighting load 100kW,

an induction motor 400hp, power factor 0.9 lagging and efficiency 0.95,
a rotary converter giving 100A at 500V at an efficiency of 0.95. What must be the power factor of the rotary converter in order that the power factor of the supply station may be unity?

3-A) Mention methods of voltage control

B) Describe, ways of improving the line voltage regulation and comparison between series and shunt capacitors

4-A) Find the relation between the generalized circuit constants (A,B,C and D)

B) Figure 1 shows a one line diagram of a simple three-phase transmission network. The values of the per-unit impedance's are shown in the Figure

i) Find the bus admittance matrix, (Y_{bus}).

ii) Eliminate nodes 4, 5 and 6 of the circuit of Figure 1 by matrix algebra, and draw the circuit described by the resulting matrix

- 5) A 15000 KVA, 8.5 KV three-phase generator has a subtransient reactance of 12 %. It is connected through a Δ -Y transformer to a high-voltage transmission line having a total series reactance of 80Ω . At the load end of the line is a Y-Y step-down transformer. Both transformer banks are composed of single-phase transformers connected for three-phase operation. Each of the three transformers composing each bank is rated 6667 KVA, 10-100 KV, with a reactance of 12 %. The load, represented as impedance is drawing 10000 KVA at 12.5 KV and 85 % power factor lagging. Draw the one-line diagram and mark base KV in the three parts of the system. Then draw the impedance diagram showing all impedances in per unit. Choose a base of 10000 KVA, 12.5 KV in the load circuit. Determine the voltage at the terminals of the generator.

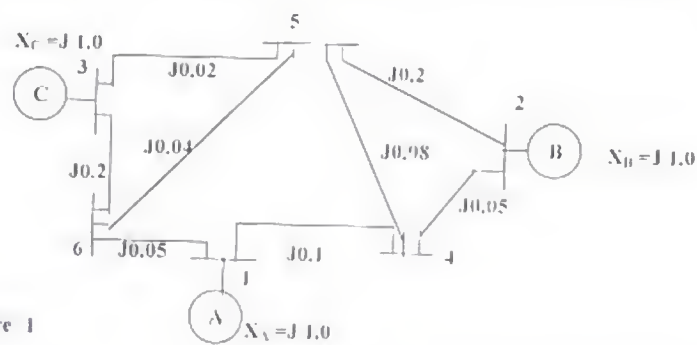


Figure 1

GOOD LUCK

السؤال الأول

- ١- ما هي الشروط الواجب اتباعها عند استخدام الجداول في التقارير ؟
- ٢- ما هي مميزات التقارير المكتوبة ؟
- ٣- كيف تكتب مقدمة التقرير بصورة جيدة؟

السؤال الثاني

- ١- ما هي مميزات برامج مولدات التقارير مع الشرح ؟
- ٢- ما هي أنواع التقارير من الزوايا المختلفة ؟
- ٣- ما هي أنواع الأشكال التوضيحية المستخدمة في التقارير مع الشرح ؟

السؤال الثالث

- ١- ما أهمية استخدام العروض التقديمية ؟ وما هي الوسائل المساعدة المستخدمة ؟
- ٢- ما هي المراحل الأساسية لكتابة التقارير ؟
- ٣- ما هي الشروط الواجب اتباعها لكتابة المعادلات في التقرير ؟

السؤال الرابع

- ١- ما هي الأنواع المختلفة لمخطط الصفحة وفيما يستخدم ؟؟
- ٢- اكتب ١٠ من القواعد العامة لإعداد التقارير ؟؟
- ٣- اكتب مقاسات الورق العالمية الآتية واستخدم لكلا منها
A0, A1, A2 , A3, A4, A5

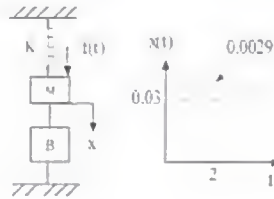
مع أطيب التمنيات بالتوفيق

أ.م.د عبد النبي قابيل

جامعة طنطا كلية الهندسة
قسم هندسة الحاسبات والتحكم الآلي
المادة : أساس التحكم الآلي
الفرقة : الثانية قوى كهربائية (لائحة قديمة)
امتحان الفصل الدراسي الثاني للعام الجامعي ٢٠٠٧/٢٠٠٦ الزمن : ثلاث ساعات

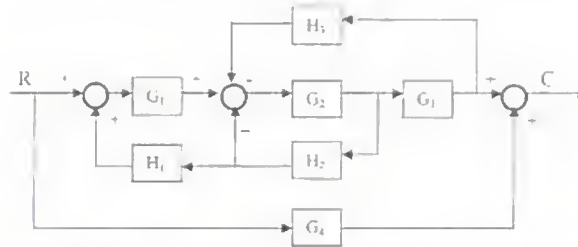
Answer the following questions:

Q1: Figure shows a mechanical vibratory system. When 8.9 N of force is applied to the system, the mass oscillates, as shown in Figure. Determine M, B and K of the system from this response curve.



Q2: Determines the overall transfer function C/R using

- a) Block diagram reduction. b) Signal flow graph.



Q3: a) For each of the following characteristic equations, find the root distribution and determine whether the system is stable, marginally stable, or unstable:

- i) $S^3 + 8S^2 + 19S + 12 = 0$
ii) $S^4 + 2S^3 + 3S^2 + 6S + 1 = 0$
iii) $S^3 + 2S^2 + 4S + 8 = 0$

b) For the open loop gain $G(S)H(S) = \frac{K(S+3)}{S(S+5)(S+6)(S^2+2S+2)}$

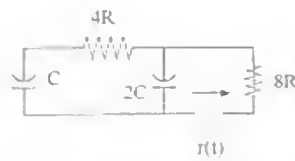
Find the range of K that the system is stable.

Q4: Draw the root locus of the following system

$$kG(s)H(s) = \frac{k(s+1)}{s(s-1)(s+6)}$$

Then determine poles and gain if settling time 4sec, for 2% error to step response.

Q5: Obtain the state space representation for the system shown, if the voltages in the capacitors are taken as state variables. Then find the state transition matrix.



Q6: a) Transform the following system to diagonal form.

Then draw the obtained state diagram.

$$\dot{\mathbf{X}} = \begin{bmatrix} 0 & 1 \\ -4 & -5 \end{bmatrix} \mathbf{X} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u$$

$$y = [1 \quad 2] \mathbf{X}$$

Then, determine whether the given system in (a) is completely state controllable and observable or not.

b) For the system that have the following transfer function

$$\frac{Y(s)}{U(s)} = \frac{s^2 + 15s + 50}{(s+1)(s^2 + 6s + 8)}$$

Give the state space in pole-zero form.

TANTA UNIVERSITY
Faculty Of Engineering
Electrical Power and Machines Engineering Department
Course : Power Electronics(1) Time : 3 hours
Year : 2nd year(Power&Machines). Date : 4/6/2007

Answer All The Questions

#Clarify your answer with the suitable sketches as you can

The first question

- a) Derive an expression for the average voltage drop due to commutation in 3- ϕ controlled rectifier.
- b) Explain the function of the Freewheeling diode.
- c) Explain using the 1-- ϕ full converter to reverse the direction of rotation of DC motor .
- d) Compare between the power transistor and the thyristor.

The second question.

1-- ϕ controlled bridge is operated from 220 v 50 Hz supply&the load resistive load $R=10\Omega$.if the average output voltage is 40%of the maximum possible average output voltage, Calculate:

- (a) the delay angle.
- (b) the rms and average output current.
- (c) the rating of each thyristor.
- (d) the input power factor.

The third question .

A 3- ϕ half controlled bridge without free wheeling diode supplied from 3- ϕ Y connected 220 v 50 Hz is used to charge a battery of 163 v emf &has internal resistance of 2Ω .A dc filter is included in the output circuit to maintain the dc current virtually smooth .Find the firing angle(α) required to supply 12A to the battery ,then calculate:

(1)

- a) the energy stored in the battery in one hour.
- b) the rms and average SCR currents .
- c) input power factor (pf)
- d) the transformer utilization factor (TUF) .
- e) Sketch considering commutation the waveforms of v_a , i_a , i_{D4} , v_{D4}

The fourth question

A 1- ϕ full converter is operated from 220 v ,50 Hz supply and uses symmetrical angle control .The load current with an average value of I_a is continuous and has negligible ripplecontent. If the conduction angle is $\beta=2\pi/3$,calculate:

- (a) the outputs v_{dc} & v_{rms}
- (h) the harmonic factor(HF)of input current.
- (c) the displacement factor.
- (d) the input power factor.

The fifth question

Power transistor (BJT)has $\beta=12$, $v_{CE(sat)}=1.2v$, $v_{BE(sat)}=1.6V$. The load resistance $R_c=1.5\Omega$. the dc supply voltage is $v_{cc}=40v$ &the input voltage to the base circuit is $v_B=6v$.If $R_B=0.7\Omega$. Determine:

- (a) the overdrive factor ODF,
- (b) The forced β .
- (c) The power loss in the transistor p_T .

Good Luck,

بسم الله الرحمن الرحيم

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الفرقة الثانية، قوى و آلات كهربية
قسم هندسة القوى والآلات الكهربائية
المادة: هندسة القوى الكهربائية (٢)
تاريخ الامتحان : ٢٨ / ٥ / ٢٠٠٧
الزمن : ٣ ساعات

Answer the following questions:

- 1-A) Derive the A,B,C and D constants for the network consisting of two network in parallel
B) A three phase ,50Hz transmission line consists of two circuits connected in parallel with the following constants.
 $A_1=D_1=0.9 \angle 1.5^\circ$ $A_2=D_2=0.95 \angle 1.2^\circ$
 $B_1=85 \angle 82^\circ \Omega$ $B_2=80 \angle 84^\circ \Omega$
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Find the A, B, C and D constants of the system. If the line delivers a load of 1100 MW at 0.9 lagging power factor and 132.0 kV, draw the combined sending and receiving end power circle diagram and find -
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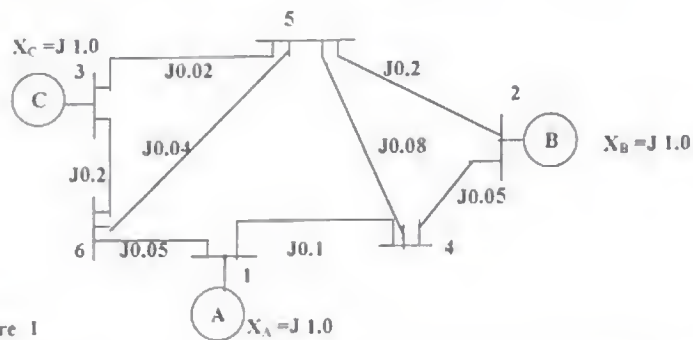


Figure 1

GOOD LUCK

أجب على خمسة أسئلة مما يلي:

- ١- ما هو الدور الرائد للصناعات الصغيرة في المجتمع ، وكيف يمكن التفرقة بينها وبين الأحجام الصناعية الأخرى ؟
- ٢- بين تأثير معدل الإنتاج للعمليات الصناعية (التشغيل) على مستويات الربح والخسارة للمنشأة الصناعية ، مع توضيح ذلك بيانياً.
- ٣- إذا كان إجمالي المبيعات السنوية لمشروع صناعي ٢٥ مليون دولار سنوياً ، فكم يقدر رأس ماله الثابت علماً بأن معدل الدوران (معامل رأس المال) هو ٣ بالنسبة للصناعة المثيلة.
- ٤- كم يبلغ قسط الإهلاك السنوي للأصول (معدات) بلغت تكلفتها الشرائية ٢٥ مليون دولار ، وتكلفة النقل والتزكيب لها ٦ مليون دولار ، علماً بأن عمر الأداء لهذه المعدات ١٠ سنوات ، وقيمة النفاية لها ٢٠% من إجمالي تكلفة الشراء والتزكيب.
- ٥- مشروع صناعي قائم وصلت إيراداته السنوية (المبيعات) ٢٥ مليون دولار ، كما بلغت التكلفة الكلية للتشغيل ١٨ مليون دولار ، ما هو العائد البسيط على إجمالي رأس المال المستثمر والمقدر بمبلغ ٣٥ مليون ريال ، وكذلك معدل العائد البسيط على رأس المال المدفوع من جانب الشركاء والذي يمثل ٥٠% من إجمالي رأس المال المستثمر في المشروع والباقي قروض بنكية ، علماً بأن المشروع يقوم بنفع ضريبة دخل مقدارها ٢٠ % على أرباحه السنوية ، كما يقوم بدفع فوائد بنكية مقدارها مليون ونصف (٥٠١ مليون) دولار سنوياً.
- ٦- كيف يمكن تقدير تكلفة المعدات بطريقة القياس ، وما هو شرط استخدام هذه الطريقة ؟ وماهي أهم البنود التي تستخدم لتقدير رأس المال المستثمر في المشروع الصناعي ؟

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أجب على خمسة أسئلة مما يلي:

- ١- ما هو الدور الرائد للصناعات الصغيرة في المجتمع ، وكيف يمكن التفرقة بينها وبين الأحجام الصناعية الأخرى ؟
- ٢- بين تأثير معدل الإنتاج للعمليات الصناعية (التشغيل) على مستويات الربح والخسارة للمنشأة الصناعية ، مع توضيح ذلك بيانياً.
- ٣- إذا كان إجمالي المبيعات السنوية لمشروع صناعي ٢٥ مليون دولار سنوياً ، فكم يقدر رأس ماله الثابت علماً بأن معدل الدوران (معامل رأس المال) هو ٣ بالنسبة للصناعة المثيلة.
- ٤- كم يبلغ قسط الإهلاك السنوي للأصول (معدات) بلغت تكلفتها الشرائية ٢٥ مليون دولار ، وتكلفة النقل والتزكيب لها ٦ مليون دولار ، علماً بأن عمر الأداء لهذه المعدات ١٠ سنوات ، وقيمة النفاية لها ٢٠% من إجمالي تكلفة الشراء والتزكيب.
- ٥- مشروع صناعي قائم وصلت إيراداته السنوية (المبيعات) ٢٥ مليون دولار ، كما بلغت التكلفة الكلية للتشغيل ١٨ مليون دولار ، ما هو العائد البسيط على إجمالي رأس المال المستثمر والمقدر بمبلغ ٣٥ مليون ريال ، وكذلك معدل العائد البسيط على رأس المال المدفوع من جانب الشركاء والذي يمثل ٥٠% من إجمالي رأس المال المستثمر في المشروع والباقي قروض بنكية ، علماً بأن المشروع يقوم بنفع ضريبة دخل مقدارها ٢٠ % على أرباحه السنوية ، كما يقوم بدفع فوائد بنكية مقدارها مليون ونصف (٥٠١ مليون) دولار سنوياً.
- ٦- كيف يمكن تقدير تكلفة المعدات بطريقة القياس ، وما هو شرط استخدام هذه الطريقة ؟ وماهي أهم البنود التي تستخدم لتقدير رأس المال المستثمر في المشروع الصناعي ؟

جامعة قنطرة	اسم - بعض الأسماء	المادة : هندسة ميكانيكية (الوحدة الجديدة)
كلية الهندسة	العام : ٢٠٠٦/٢٠٠٧	الفئة : الثانية (تربية) (مؤهل)
		الترتيب : ثلث ساعات

أجب عما هو مطلوب

السؤال الأول

- ١- اشرح مع رسم الفرق بين انتقال الحرارة بالتوصيل والحمل والإشعاع
- ٢- اذكر معادلة سريان الحرارة والمقاومة الحرارية من حيث الحالات الثلاثة :-
جدار مسطح - أسطوانة طويلة - كرة صلبة - سطح صلب
- ٣- موديل منزل على شكل متوازي مستطيلات ذي أبعاد داخلية
 $46 \text{ cm} \times 61 \text{ cm} \times 76 \text{ cm}$ ، أبعاده الخارجية هي $51 \text{ cm} \times 66 \text{ cm} \times 81 \text{ cm}$ ، أبعاد
العنبر الداخلية للموديل بالواط والوزن لأحداث حاله بالاستقرار ، نحصل للحرارة المفقودة
لأركان وموديل مع العلم أنه درجة حرارة الجدران الداخلية والخارجية هي 20°C ،
 38°C على التوالي وأنه الجدران مصنوعة من مادة الاسبتوس .

السؤال الثاني

- ١- اشرح مع رسم انتقال الحرارة بالحمل والتهديد والحمل الحراري ؟
- ٢- استنتج معادلة انتقال الحرارة بالتوصيل من خلال أسطوانة متحدة المركز ؟
- ٣- لوح معدن رقيق يربط بين وجهي أسطوانة متحدة المركز ، بينهما
بيوت سطحه الداخلي بالاشعاع للوسط المحيط والذي درجة حرارته 50°C ، وجهه
درجة حرارته هذا السطح معتبرا أنه سطح أسود .
(علما بأن ثابت استيفان بولتزمان $5.67 \times 10^{-8} \text{ W/m}^2 \text{ K}^4$)

السؤال الثالث

- ١- اذكر الفرق بين السريان الطبقي والسريان المضطرب ، ثم اشرح مع رسم تجربة
رينولدز
- ٢- اشرح الأنواع المختلفة لاضطراب السريان ، ثم استنتج معادلة برنولي ؟
- ٣- نافورة مياه قطرها 7.5 سم تتدفق من أنبوب مياه بضغط 30 م/ت وصفت لوصف
منضبة تغير اتجاهها 20 كجم أو بعد القوة المؤثرة بواسطة النافورة على اللوحة بنية
واتجاهها . يملك تجايل مئة الاضطراب .

السؤال الرابع

- ١- اشرح مع رسم لتجربة عمل مقياس الفنتوري لقياس الفرق للسرعات ؟
- ٢- اشرح مع الرسم المانومتر على شكل حرف U والمانومتر المائي مع ذكر الفرق بينهما ؟
- ٣- تربية غازي يستخدم في محرك ديزل فإذا كان الماء المتدفق عند المدخل 132 kJ/kg
وسرعة الغازات 2.5 m/s والمتدفق عند المخرج 80 kJ/kg وسرعة الغازات 1 m/s
فإذا كان معدل السريان 0.2 kg/s احسب القدرة الناتجة من التربين (باعتبارها معزولة)

السؤال الخامس

- ٢- اشرح مع الرسم لمكونات المحارة المركزية ، ثم عرّف خلاصه الضغوط :
ب- اذكر المصنفه الرياضيه للقانونه الدول لديناميكا الموائع ثم اشرح كيف يمكن تطبيقه في هذه الحالات الثلاثه :
المبادل الحراري المسطح - المكثف - المضاعف - النظام المطلق
٣- اشرح مع الرسم ترتيب الاسطوانات في محركات الاحتراق الداخلي ، ثم راجع خصائص كل نوع .

السؤال السادس

- ٢- اشرح مع الرسم قطاع من اسطوانة محرك احتراق داخلي رباعي الاسواط وثلاث الاسواط :
ب- عرّف كل من :
القدرة النوعية - نسبة الانضغاط - السرعة المحورية - الكثافة المحورية
د- محرك ديزل رباعي الاسواط ذو اسطوانة واحدة - قطر 140 mm وطول اسطوانة 140 mm راجع له البيانات التاليه اثنان اضمحاره
السرعة 900 r.p.m
قوة المحرك 180 N
ذراع المحرك 600 mm
الضغط المتوسط الميكانيكي 7.8 bar
اصح
١- القدرة الفعاله
٢- الكثافه الميكانيكيه .

بسم الله الرحمن الرحيم

جامعة طنطا
كلية الهندسة
قسم هندسة القوى والآلات الكهربائية
المرحلة الثانية، قوى والآلات الكهربائية
المادة، أساس هندسة القوى الكهربائية
الرمز: ٢ مائة
تاريخ الامتحان: ١٨ / ١ / ٢٠٠٧

Answer the following questions:

1-a) Define -

- i) Ferranti Effect
- ii) Skin Effect
- iii) The transposition cycle of the conductors

b) A three- phase transmission line 8 Km long is to deliver 6 Mw at 33 Kv (line) at the receiving end. The per - phase reactance of the line is 1Ω per Km, and the power factor at the receiving end is 0.9 lagging. If the line voltage at the sending end is maintained at 34.7 Kv. The resistivity of copper is $1.7 \mu \Omega \text{ Cm}$. Calculate -
I) The size of the conductors, II) The efficiency of transmission line, and
III) The power factor at the sending end

- 2) A single -circuit 3-phase 50 Hz transmission line, 100 miles long, has its conductors arranged at the corners of a triangle whose sides are 25, 20 and 15 ft in length, and the conductors are regularly transposed. The conductors are of diameter 0.5 inch and resistance 0.15Ω per mile per conductor. If the line is delivering a full load of 100 MVA at a power factor of 0.85 lagging and at 132 Kv. Calculate -
i) The voltage, the current, and the power factor at the sending end
ii) The efficiency of transmission line, and
iii) The percentage regulation
Use the nominal π - method

3-a) Explain the main types of insulators

- b)) A string of suspension insulators consists of four units. The capacitance between each link pin and earth is one - tenth of the self capacitance of a unit. The voltage between the line conductor and earth is 66 Kv. Find -
I) The voltage distribution across each unit, and
II) The string efficiency
Derive any relation used

- 4) An overhead line has a span of 250 m and is supported at level ground. The conductor has a cross-section of 1.29 cm^2 and weighs 1.13 Kg/m . The breaking strength of the conductor is 4220 Kg/cm^2 and factor of safety 2. Calculate the height of the conductor above the ground level at which it should be supported if a minimum clearance of 6.71 m is to be kept between the ground and the conductor. Assume wind pressure of the projected area is to be 40 Kg/m^2 . Derive any relation used.
-

- 5-a) Compare the weights of copper used in case of single-phase, two-wire system, three-phase, three-wire system, and three-wire direct current system. Assume the same transmitted power, same maximum voltage between the conductors, same losses over a same distance, and the cross-sectional area of the neutral wire is same that of the others.

- b) A three-wire D.C. distributor PQ, 250 metres long, is supplied at end P at 400/200 V and is loaded as under:
Positive side: 20 A 150 metres from P, 30 A 250 metres from P.
Negative side: 24 A 100 metres from P, 36 A 220 metres from P.
The resistance of each outer wire is 0.02Ω per 100 metres and the cross-section of the middle wire is one-half that of the outer.
Find the voltage across each load point.
-

- 6-a) Make a comparison between DC and AC distribution systems.

- b) A three-phase, four-wire system with 400 / 230 V is loaded as follows:-
i) 25 H.P. three-phase induction motor having an efficiency of 90% and lagging power factor 0.85,
ii) 20 KW, three-phase load having a lagging power factor of 0.9,
iii) a single-phase load of 10 KW at unity power factor between R and N,
iv) a single-phase load of 5 KW at 0.8 power factor lagging between B and N.
Calculate the currents in all the four-wires of this three-phase, four-wire system.
-

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اجب على خمسة أسئلة مما يلي :

- ١ - بين مع الشرح المكونات الرئيسية التي تدخل في تقدير إجمالي رأس المال الواجب استثماره في احد المشروعات الصناعية .
- ٢ - يؤثر معدل التشغيل (الانتاج) في العمليات الصناعية على معدلات الربح والخسارة لهذه العمليات الصناعية ، اشرح ذلك مع الايضاح بيانيا .
- ٣ - تكلفة الشراء لمبديل حراري مساحته السطحية ١٠ قدم مربع هي ٣٠٠٠٠ دولار وذلك في عام ١٩٩٤ ، ما هي تكلفة الشراء لمبديل حراري مثيل مساحته السطحية ٢٠ قدم مربع في عام ٢٠٠٢ ؟
(معامل مارشال و سويغت لتكلفة المعدات هو ٩٩٤ لعام ١٩٩٤ و مقداره ١١٠٤ لعام ٢٠٠٢ ، كما ان قيمة المعامل الثابت س للمبيلات الحرارية هو ٠.٦)
- ٤ - ماهي الوسائل المختلفة لتقدير إجمالي تكلفة المنتج ؟
و ماهو المقصود بكل من :
تكاليف الإنتاج المباشرة
تكاليف الإنتاج الثابتة
تكاليف الإنتاج الإضافية
- ٥ - عرف ما يلي :
القيمة الدفترية للأصل
القيمة السوقية للأصل
قيمة الإحلال للأصل
و ماهي قيمة الأصل (معدة) بعد خمس سنوات من بدأ تشغيله علما بان تكلفة الشراء بما فيها التركيب هي ٢٥٠٠٠٠ دولار و أن العمر المقدر لهذا الأصل هو عشر سنوات ؟
- ٦ - احسب القيمة المضافة السنوية ، و صافي القيمة المضافة السنوية لمشروع صناعي قائم يصل حجم مبيعاته ٧٥ مليون دولار سنويا ، و قيمة المواد الداخلة (أو المواد التي يشتريها المشروع من خارجه) هي ٣٠ مليون دولار ، كما أن قسط الإهلاك السنوي لهذا المشروع ٥ مليون دولار .

المسألة الأولى:-

وضح بالرسومات المنقطة وكافة البيانات على الرسم كلا مما يأتي:

- قضاع في تربة منتظمة.
- التركيب الحبيبي للتربة الطينية و تربة الرمل والزلط.

المسألة الثانية:-

- عرف التربة، وكيف تكونت؟
- اذكر ما نعرفه عن كل من: التربة النهرية - التربة العسوية.
- ماهي هم الفروق بين التربة المتناسكة والتربة الغير متناسكة؟
- اذكر باختصار أهم سبب تولد الاجهادات داخل التربة.
- احسب قيمة الاجهادات الكلية المتولدة في كابل كهربائي نتيجة حمل مركز مقداره ١٠ طن يؤثر على سطح الارض، اذا علمت ان الكابل يقع أفقياً على بعد ٥ أمتار من مكان تأثير الحمل وعلى عمق ٣ أمتار أسفل الحمل وأن وزن وحدة الحجم للتربة الموجود بها الكابل هو ١,٨ طن / م^٣.

ملاحظة:
$$\Delta \sigma_v = \frac{3P}{2\pi z^2} \left[\frac{1}{1 + (r/z)^2} \right]^{3/2}$$

المسألة الثالثة:-

- عرف الأساس، وما هي أهم الشروط الواجب توافرها عند اختيار أساس أي منشأ؟
- اذكر مستعينا بالرسم أهم أنواع الأساسات السطحية، مع توصيف متى يتم استخدام كل نوع منها.
- ما الفائدة مستخدم سماعات لكل من الأساسات السطحية والأساسات العميقة؟

المسألة الرابعة:-

- وضح بالرسم نوعين من الأعضاء الإنشائية المركبة مع توصيف الاعضاء الإنشائية الأولية التي يتكون منها كل نوع.
- اذكر انواع الاحمال التي يمكن أن تؤثر على المنشآت.
- الكمرة الموصفة بالشكل، المطلوب تحديد قيم ردود أفعال الركائز ثم رسم أشكال توصيف قيم وتوزيع القوى الداخلية العمودية (N.F.D.)، وقوى القص (S.F.D.)، وقوى العزوم (B.M.D.) المتولدة داخل الكمرة نتيجة الحمل المركز المؤثر عليها علماً بأن الأبعاد الموصفة بالشكل.



أعطيب الامتياز بالنجاح والتفوق

امتحان الفصل الدراسي الأول ٢٠٠٦/٢٠٠٧

جامعة طنطا

الفرقة : الثانية كهرباء - قوى

كلية الهندسة

الزمن : ثلاث ساعات

المادة : الهندسة المدنية

السؤال الأول

- أ- أذكر ما تعرفه عن كل من الآتي مع توضيح أحاسنك بالرسم كلما أمكن :
- الزاوية الممنوعة - زاوية الانحراف الرأسى - العدسة السائلة - الروبر الحائطي - نقطة الدوران - خط النظر في تلسكوب ميزان القامة.
- ب- المطلوب تصميم ورسم مقياس رسم تخطيطي ١ : ٦٠٠ بقراً مباشرة إلى اقرب نصف دراع معماري ثم بين عليه خطا طوله ٥٣,٥ دراع معماري.

السؤال الثاني

يراد مد خط كهرباء ضغط عالي بين خمسة أبراج معدنية فإذا قيست المسافة الأفقية بين كل برجين متاليين من خريطة بمقياس رسم ١ : ٥٠٠ فكانت مساوية ١٨,٦ سم وكانت الأبراج بنفس الارتفاع وسطح الأرض بميل معدل ١ : ٦ فإذا علمت أن الترحيم في منتصف المسافة بين كل برجين - ٧,٢ متر أوجد طول الكابل الحقيقي الذي يجب صرفه من المخازن.

السؤال الثالث

أخذت القراءات الآتية بالأمتار في ميزانية أجريت في موقع كوبري علوي وكانت كما يلي:

٢,٣٣ - ٣,٢٢ - ١,٦٨ - ٢,١٦ - ٢,٥٤ - ٢,٥٧ - ١,٩٦ - ٣,١٤ - ٢,٢٣ - ٢,٧٨ - ٢,٦٥ - ٣,٤٨ - ٢,٥٩ - س - ١,٧٩.

فإذا علمت أن منسوب النقطة الخامسة = ١٠,٤٨ متر وأن الميران نقل بعد القراءات الرابعة والسابعة والثانية عشر، وأن النقطة السادسة مأخوذة على كمره الكوبري العلوي والقامة مقلوبة

المنطوب:

- ١- إيجاد مناسيب النقاط المختلفة في جدول ميزانية كامل
- ٢- عمل جميع التحقيقات الحسابية
- ٣- إيجاد مقدار القراءة (س) إذا علمت أن هذه القراءة فوق نقطة مسووها - ٧,١٨ م

مع تمبائي بالتوفيق

د. حافظ عباس عفيفي

بسم الله الرحمن الرحيم

جامعة طنطا
كلية الهندسة
قسم هندسة القوى والآلات الكهربائية
تاريخ الامتحان : ٢٨ / ١٢ / ٢٠٠٦
الزمن : ٢ ساعات
امتحان الفصل الدراسي الأول
الفرقة الثانية: قوى وآلات كهربائية
المادة: هندسة القوى الكهربائية (١)

Answer the following questions:

1-a) Define -

- i) Ferranti Effect
- ii) Skin Effect
- iii) The transposition cycle of the conductors

b) A short three- phase transmission line delivers a balanced load of 250 A at a power factor of 0.9 lagging. The impedance per conductor is $(0.25 - j1.0)$ ohm. Calculate the sending-end line voltage necessary to maintain the efficiency of transmission at 95 per cent.

- 2) A single circuit 3-phase 50 Hz transmission line, 100 miles long, has its conductors arranged at the corners of a triangle whose sides are 24, 20 and 10 ft in length, and the conductors are regularly transposed. The conductors are of diameter 0.55 inch and resistance 0.15Ω per mile per conductor. If the line is delivering a full load of 90 MVA at a power factor of 0.8 lagging and at 132 Kv. Calculate -
- i) The voltage, the current, and the power factor at the sending end
 - ii) The efficiency of transmission line, and
 - iii) The percentage regulation
- Use the nominal T- method

3-a) Explain the main types of insulators

- b) The bus - bar conductor of a sub station are supported by post insulators consisting each of three pin insulators fixed one on the top of the other. The voltage across the lowest insulator is 14.82 KV and that across the next is 12.26 KV. Assume the system as three phase, three wire. Find the voltage between the bus - bars. Calculate the string efficiency. derive any formula used

- 4) The conductor of 132 KV line has a diameter 2.1 cm and weight 0.8 kg/ meter. The ultimate strength being 10000 kg. Calculate the height above ground at which the conductors with a span of 300 meters should be supported, the factor of safety being 2. Wind pressure is 100 kg/m². Ground clearance required is 6.1 meters. Find out the change in the height of conductor if there is an ice coating of 1.0 cm. Derive any formula used.
-

- 5-a) Compare the weights of copper used in case of single-phase, two-wire system, three-phase, four-wire system, and three-wire direct current system. Assume the same transmitted power, same maximum voltage between the conductors, same losses over a same distance, and the cross-sectional area of the neutral wire is same that of the outers.

- b) The load on a D.C. three-wire system with 400V between outers consists of lighting current of 2000 A on the positive side and 1500 A on the negative side while motors connected across of the outers absorb 500 KW. If at this loading, the balancer machines have each a loss of 7.5 KW. Calculate the current in the neutral, the current in each armature of the balancer set, the total current supplied by the generator and the KW loading of each balancer set.
-

- 6-a) Make a comparison between DC and AC distribution systems.

- b) A three-phase, four-wire system with 400 / 230 V is loaded as follows -
- 20 H.P. three-phase induction motor having an efficiency of 90% and lagging power factor 0.8,
 - 25 KW, three-phase load having a lagging power factor of 0.9,
 - a single-phase load of 8 KW at 0.85 power factor lagging between R and N,
 - a single-phase load of 5 KW at unity power factor between Y and N,
 - a single-phase load of 3 KW at unity power factor between B and N.
- Calculate the currents in all the four-wires of this three-phase, four-wire system.
-

GOOD LUCK

و

Course: Energy Co.

Final Exam, 2005-2006

2nd Year (Dept. Electric Power & Machines Eng.) Time: 3 hours

بالحققت هامة: لا تعرض عن أي من هذه π بل أنتجها (المعروفة) بل أنتج الأجرية بدلتها
 الفرض ومن الوقيما والقيمة أي مطبوع تم تكرر وتضمنها
 وصح لجانبك بالمثل توضيحية مرسومة بغاية ومعدلات كلما أمكن ذلك

Question 1

- Sketch neatly two-pole doubly excited rotary electromechanical energy conversion systems with salient rotor and non-salient stator and coil axes displaced by an angle θ . Neglecting the leakage flux, sketch the flux paths for different rotor position and appropriate مستحبة excitation to determine expressions for self and mutual inductances with reasoning مع ذكر الحجج.
- Derive an expression for the energy stored in a stationary coil with non-linear magnetic circuit in terms of flux density and magnetic field intensity. It shows that the area of the first quadrant of the hysteresis loop is proportional to the hysteresis energy loss during the period of that first quadrant: find constant of proportionality.
- Derive an expression for the energy stored in a coil with linear magnetic circuit in terms of inductance.
- Derive an expression for the electromagnetic force in a doubly-excited magnetically-linear translational system in terms of inductances, currents and the position x .
- Give a logical or a mathematical explanation for the negative sign in Lenz's law.
- Derive an expression for the mmf that results from a balanced two-phase winding excited by balanced two-phase currents in terms of position and time.
- Draw the expression for two instants and hence deduce استنتج the speed of mmf.
- Draw mass and energy flow diagram for fossil fuel combustion.
- Aided with illustration the principle of hydroelectric power generating plant using tidal basins.
- Sketch expanded view of a flat-plate solar collector.

Questions 2

A 2-pole motor has a single winding in the each of the stator and rotor. θ angle between the magnetic axis of the stator winding (named a) and the rotor r (named δ). The self and mutual inductances of the two windings are: $L_{aa}=L_a-L_2$ C $L_{rr}=L_r$ (i.e. constant); $M_{ar}=M \cos \theta$ where I_a, I_r, L_a, L_r and M are f constants. The rotor is revolving at a speed ω so that its instantaneous angular θ is given by $\theta = \omega t - \delta$ where δ is a small phase angle describing the position of the r $t = 0$.

- a) If the rotor winding is excited by a constant d-c I_r and the stator winding carries current $i_s(t) = \sqrt{2} I_s \cos \omega t$, derive an expression for the average electromagnetic torque. b) If the rotor and stator windings are excited by a constant d-c I_r and I_s respectively, derive an expression for the average electromagnetic torque.

Question 3

Fig. P3 shows a section of a machine having two identical stator windings a and b in quadrature. The self inductances L_{aa} , L_{bb} and L_{ϕ} are constants. The r

Inductances between the rotor and the stator windings are function of the angular position of the rotor as follows: $M_{ar} = M \cos \theta$; $M_{br} = M \sin \theta$; $a = b$ and $M_{aa} = 0$, where M and h are positive constants. The rotor is revolving at a speed ω so that its instantaneous angular position is given by $\theta = \omega t - \delta$ where δ is a small phase angle describing the position of the rotor at $t = 0$. If the rotor winding is excited by a constant $d < l_r$ and the stator windings carried balanced two-phase currents $i_a(t) = \sqrt{2} I_a \cos \omega t$ and $i_b(t) = \sqrt{2} I_a \sin \omega t$, derive an expression for the instantaneous voltages of the stator phases a and b .

Question 4

A composite magnetic circuit of varying cross section is shown in Fig. P4 (a); the iron portion has the B-H characteristic of accompanied Figure (b). (Given: $l_1 = 2 l_2 = 7 \text{ cm}$; $A_1 = 2 A_2 = 4 \text{ cm}^2$; $\mu_r = 0.005 \mu_0$; leakage flux is negligible. Calculate the energy stored and the coenergy in the air-gap and in iron for an air-gap flux density of 0.3 T (employ a straight line approximation).

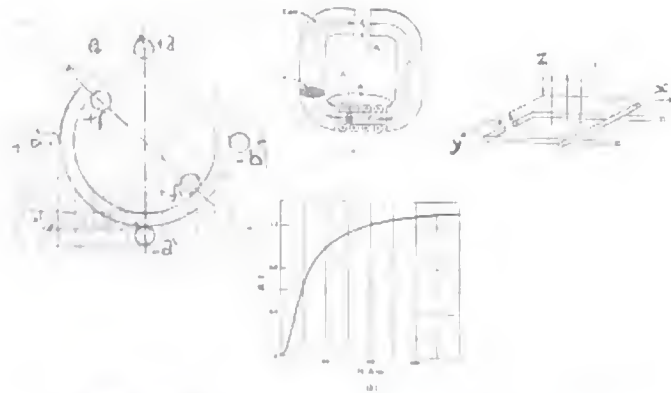
Question 5

The rails shown in Fig. P5 are separated 5 cm and extended 2.4 m from the gap ab . If $B = 0.43 \text{ mT}$ and the position of the sliding bar is given by: $x = 5.4 t - 3 t^2 \text{ m}$ (a) Find the magnitude of V_{ab} when $t = 1 \text{ ms}$. (b) If ab is shorted and the circuit resistance is 1 Ohm , derive an expression for the instantaneous mechanical power. Neglect any change in the magnetic field caused by the flow of electric current.

Fig. P3

Fig. P4

Fig. P5



END OF EXAM

LUCK ◀GOOD▶ BYE

Final_2E_Power_Energy_Conv_2005-6.doc

بسم الله الرحمن الرحيم

جامعة طيطا	امتحان، الفصل الدراسي الأول
كلية الهندسة	الفرقة الثانية، قوى والآلات الكهربائية
قسم هندسة القوى والآلات الكهربائية	المادة، أساس هندسة القوى الكهربائية
تاريخ الامتحان، ٢٠١٨ / ١ / ٢١	الزمن، ٣ ساعات

Answer the following questions:

- 1-a) Define:-
- Ferranti Effect.
 - Skin Effect.
 - The transposition cycle of the conductors .
- b) A short three- phase transmission line delivers a balanced load of 200 A at a power factor of 0.8 lagging .The impedance per conductor is $(0.75+j1.0)$ ohm . Calculate the sending- end line voltage necessary to maintain the efficiency of transmission line at 90 per cent .
-
- 2)A single circuit 3-phase 50 Hz transmission line, 100 miles long, has its conductors arranged at the corners of a triangle whose sides are 25, 20 and 15 ft in length, and the conductors are regularly transposed. The conductors are of diameter 0.5 inch and resistance 0.15Ω per mile per conductor. If the line is delivering a full load of 100 MVA at a power factor of 0.9 lagging and at 132 Kv. Calculate :-
- The voltage, the current, and the power factor at the sending end.
 - The efficiency of transmission line, and
 - The percentage regulation.
- Use the nominal T- method.
-
- 3-a) Explain the main types of insulators.
- b) A string of overhead suspension insulators consists of four units. The capacitance between units is 7.0 times of the capacitance between each unit and earthed frame work. If the maximum peak voltage per unit is not exceed by 25 KV. Find the maximum voltage which the string of insulator can with stand. Calculate the string efficiency, derive any formula used.
-

-
- 4) An overhead transmission line conductor having a parabolic configuration weight 1.6 kg/m length, area of cross-section of 2.2 cm^2 and an ultimate strength of 8000 kg/cm^2 . When erected between supports 500 meters apart and having 15 meters difference in heights. Determine the vertical sag from the taller of the two supports which must be allowed so that the factor of safety shall be 2 with the wire loaded due to 1 kg of ice per meter and wind pressure is 80 kg/m^2 .
Derive any relation used.
-

5-a) Make a comparison between DC and AC distribution systems.

- b) The load on a D.C. three-wire system with 400V between outers consists of lighting current of 2000 A on the positive side and 1500 A on the negative side while motors connected across of the outers absorb 500 KW. If at this loading, the balancer machines have each a loss of 7.5 KW. Calculate the current in the neutral, the current in each armature of the balancer set, the total current supplied by the generator and the KW loading of each balancer set.
-

- 6) A single-phase distributor, one Km long has resistance and reactance per conductor of 0.05Ω and 0.1Ω respectively. At the far end, the voltage $V_R = 250 \text{ V}$ and the current is 120 A at a power factor of 0.8 lagging. At the mid-point A of the distributor, a current of 100 A is tapped at a power factor of 0.6 lagging with reference to the voltage V_A at the mid-point. Calculate the supply voltage V_S for the distributor, the phase angle between V_S and V_R and the distributor's efficiency.
-

GOOD LUCK

الفصل الدراسي الأول ٢٠٠٧/٢٠٠٨

الفرقة : الثانية كهرباء - قوى

الزمن : ثلاث ساعات

جامعة طنطا

كلية الهندسة

المادة : الهندسة المدنية

أجب على جميع الأسئلة الآتية

السؤال الأول

- أ- أذكر العوامل التي يتوقف عليها إختيار مقياس رسم الخريطة.
ب- المطلوب تصميم ورسم مقياس رسم تخطيطي ١ : ٨٠٠ يقرأ بدقة ٠,١٢٥ قصبة - ثم بين خطأ طوله ٢٨,٦٢٥ قصبة على هذا المقياس.

السؤال الثاني

- أحدث القراءات الآتية في ميزانية فكاكست ٢,١٤ - ١,٦٧ - ٢,٢٨ - (١,٢٥) - ٣,٦٧ - ١,٤٤ - (٣,٧٦) - ١,٨٦ - (١,١٧) - ٣,٦٤ - (٢,١١) - س - ٢,٦٧ - ١,٢٢ .
أوجد في جدول ميزانية كامل مناسب النقط المختلفة عنماً بأن مسوب النقط الأولى - ٣,٦٨ متر وأن القراءات بين الأقواس مؤخرات والقراءة عند النقطة الرابعة مسقف قو أحدثت والقائمة مقلوبة. أوجد أيضاً القراءة من حتى يكون مسوب هذه النقطة مساوياً مسوب النقطة الخامسة ثم تحقق من صحة العمل الحسابي بجميع معادلات التحقق.

السؤال الثالث

- شريط طوله الاسمي ٥٠ متر تمت معايرته وهو مستند على كامل طوله في درجة حرارة ٦٨ وهرغيت فوجد أن وزن المتر الطولي منه = ٠,٠٢٦ كجم وطوله الحقيقي يساوي ٤٩,٨٤ متر فإذا استخدم هذا الشريط لقياس حقل على أرض محدرة بمعدل ١٠ % في نفس درجة حرارة المعايرة وكان العقول المقاس للحقل ٤٤٦,٧٨ متر وكان الشريط مرتكزاً عند طرفه فقط جميع طرحات القياس وكان الشد عليه مساوياً ١٢ كجم - أوجد الطول الصحيح للحقل المقاس.

السؤال الرابع

- أ- ما هي الخواص الهندسية للتربة ؟ عرف كل منها.
ب- اذا كان هناك حمل رأسي قيمته ٤٠ طن يرتكز على قاعدة حرسانية مربعة ذات أبعاد ٢ متر عرض و ٣ متر طول. أحسب الشد في الاحهاد الرأسي على التربة عند نقطة تقع تحت مركز القاعدة الحرسانية على عمق ٤ متر تحت سطح القاعدة الحرسانية.
ت- ما هي العوامل المختلفة التي تؤثر في خاصية انضغاطية التربة ؟
ث- اشرح بإيجاز مع الرسم الأنواع المختلفة للأساسات السطحية والأساسات العميقة ؟ وكيف يتم إختيار كل نوع منها ؟

مع ثنيتنا بالتوفيق أ.م.د / مروان المغاوري شاهين أ.م.د / حافظ عباس عفيفي

ادخاله + فون (هـ بـ هـ قـ دـ عـ فـ)

الهـ

Tanta University - Faculty of Engineering
Department of Physics and Mathematics

Final Examination - Second Year (Comuni & Power Elec.)

Subject: Mathematics

Date : 12/1/2018

Time : 3 Hours

Answer the following Questions

1-a) If a car is traveling along a straight road with constant speed $v = b_0 + b_1 t$ [m-sec.], its position y [m] at time t [sec.] is $y = b_0 t + b_1 t^2$. Suppose that measurements are

t	0	3	5	8	10
y	200	230	240	270	290

Fit a straight line to these data by least squares and estimate from it the speed.

1-b) Given the data

x	0.1	0.2	0.3	0.4	0.5
$y = f(x)$	0.70010	0.4016	0.1081	-0.1744	-0.4375

Find an approximate value of the zero of $f(x)$ between 0.3 and 0.4

1-c) Obtain the estimate of the missing figures in the following table

x	2.0	2.1	2.2	2.3	2.4	2.5	2.6
$f(x)$	0.135	--	0.111	0.100	--	0.082	0.074

2-a) Evaluate $I = \int_0^1 e^{-x^2} dx$ by Simpson's Rule with $n = 10$

2-b) Find the value of y at $x = 2.6$ by using modified Euler's Methods with

$h = 0.2$, if $y = \sqrt{x^2 + 4y^2}$, $y(2.2) = 1.5$

2-c) Apply Runge - Kutta Method to find an approximate value of y when $x = 0.2$ given that

$$\frac{dy}{dx} = x + y, y = 1 \text{ when } x = 0 \text{ (take } h = 0.1)$$

2-d) Compute numerically the first two rows of the solution of the wave equation

$$\frac{\partial^2 u}{\partial t^2} = 4 \frac{\partial^2 u}{\partial x^2}, \quad 0 \leq x \leq 1, t \geq 0$$

with the boundary and initial conditions

$$u(0, t) = u(1, t) = 0$$

$$u(x, 0) = \sin \pi x, \quad \frac{\partial u}{\partial t}(x, 0) = 0$$

جامعة مؤتة	اتحاد الفضل للدراسة الأولى	الغزوة: الثانية كبرياء (قدس)
مكة الهندسة	العام ٢٠٠٧ / ٢٠٠٨	لأنه جديد
	نظام ٢٠٠٨	المادة: هندسة ميكانيكية
		الاسم: شعراة ساعات

أجب عما لا يسأله الدتية :-

استخدم الرسم كما أطلب ذلك

السؤال الثاني

- ١- استنتج معادله برنولي للتيار في سائل مثالي مستقر؟ ثم استمر كيف تتغير هذه المعادلة لتيار مستقر في سائل حقيقي موضعنا الإجابة بالرسم؟
- ٢- استمر التمثيل الهندسي لمعادله برنولي؟
- ٣- اذكر ما تعرفه على: ١- الميل الريوليكي ٢- الميل البيزويكي ٣- ادراته المروية للزوجة المائعة؟
- ٤- منحنى توزيع السرعة للمائع في أنبوب دائري يعطى بالمعادلة $V = V_m \left[1 - \frac{r^2}{R^2} \right]$ حيث V_m هي السرعة عند محور الأنبوب، R هي نصف قطر الأنبوب.
- ٥- اوجد السرعة المتوسطة V_m بدلالة V_m .
- ٦- اوجد النسبة بين اللزوجة الحقيقية إلى اللزوجة المحسوبة بدلالة سرعة الوسط.
- ٧- اوجد لعدد بين عدد تيفر لتيار المروية الحقيقية إلى عدد تيفر لتيار المحسوبة بدلالة سرعة الوسط.

السؤال الثالث

- ١- استمر مع الرسم الهدف الأساس باستخدام الصيغ؟ ثم استمر مع الرسم أيضا المعطى بالمعادلة $\frac{u}{u_0} = \frac{1}{2} \left(1 + \frac{z}{L} \right)$ اذكر به؟ ثم عرف ظاهرة التفرع في الصفيحة؟
- ٢- استمر مع الرسم تفرع من نوع u -table manometer The inclined table manometer.
- ٣- استنتج الصيغة الرياضية للقانون الأول للديناميكا الحرارية؟ ثم استمر كيف يمكن تطبيقه على: ١- المبرد (الردياتير) ٢- المكثف أو التبريد.
- ٤- محرك حراري ينتج شغل ميكانيكي بمعدل 75 kW يستعمل المحرك المادة العاملة بالبخار داخليه مقدارها 1500 kJ/kg وحرارة الانسياب الخارجة 176 kJ/kg ، فإذا كان معدل انسياب المادة العاملة خلال المحرك 1050 kg/hr وكانت حرارة الانسياب عند المخرج 256 kJ/kg ، اوجد معدل فقد الحرارة مع المحرك 3500 kJ/min .
- ٥- احسب الحرارة المرافضة من مادة العاملة عند المخرج بوحدة kJ .

السؤال الثالث

- ٢- استرجع الرسم نظام مناسعة منارة منارة داخلية :-
- ١- رابع لا يتولا ١- ثنائيات الأوتار موصلة وخفيفة كل جزء
 - ٢- اذكر سبعة مزايا منارة التبريد منارة البرزخ ؟
 - ٣- اذكر العوامل التي تؤثر على القدرة القصوى للمحرك ؟
 - ٤- مزاياها :- منارة الانضغاط - الكثافة الجنية - الضغط المنخفض الجين - القدرة المنخفضة
 - ٥- محرك اشتعال بالقطة (ديزل) رابع الأوتار يدور بسرعة 800 r.p.m ويستعمل 113 سم الوقود في 4 min شامع بولدمر 80 mm تباد الماء المحرك ذو اسطوانة واحدة قطر 125 mm وطول السوط 135 mm والقيمة الحرارية للوقود المستعمل 42000 kJ/kg . اكتب :-
 - ١- القدرة الفعلية ٢- الضغط المتوسط الفعال ٣- المعدل الوزني الفعال المستعمل ٤- الكثافة الحرارية الفعلية ٥- السرعة الوسطية للمكبس .

السؤال الرابع

- ٢- اذكر مزاياها عند صيانة دور - الوقود من محرك البرزخ ؟
- ١- استرجع الرسم التآخر التبريد والهدر والحرارة ؟
 - ٢- استرجع معادله التبريد الحراري في الحالات الآتية :-
 - ٣- اذكر مزاياها عند صيانة دور - الوقود من محرك البرزخ ؟
 - ٤- استرجع معادله التبريد الحراري في الحالات الآتية :-
 - ٥- استرجع كيف يتغير القانون الأول للديناميكا الحرارية من النظام المغلق والنظام المفتوح ؟ اذكر أمثلة لكل منهما
 - ٦- استرجع معادله انتقال الحرارة بالاشعاع بين سطحين ؟
 - ٧- معادله انتقال الحرارة بين سطحين متوازيين مستطيلين افقية هي :-

أبعاد - الداخلية 50 cm x 60 cm x 80 cm

البعد الخارجية 55 cm x 65 cm x 85 cm

أقصى القدرة الحرارية المحركة بالواط الموزنة للمحرك حاله الاستقرار . نحصل الحرارة المحركة لدرجات حرارة المحرك مع العلم ان درجة حرارة الجدران الداخلية والخارجية 200 °C ، 40 °C على التوالي وأنه الجدران مغطاة بمادة التوصيلية الحرارية له 0.166 W/(m.k)

الجامعة
البحرية

TANTA UNIVERSITY
Faculty of Engineering
Power Engineering & Electric Machines Department

Course : Electromagnetic fields	Exam : Final
Code : EPM2142	Time : 3 Hours
Year : 2 nd year Electronics & Communications	Date : 21 / 1 / 2007

QUESTIONS ARE IN TWO PAGES

ANSWER THE FOLLOWING QUESTIONS:

Question(1)

- a) Aided with clear sketches, write down the mathematical equations for the following terms
 - i) Gauss's law
 - ii) Divergence theorem in spherical coordinates.
- b) Derive an expression of the potential difference between two points A at a distance r_A and point B at a distance r_B from a point charge Q
- c) A line is located in free space on the line $y = 1$, $z = 2$ and it has a uniform line charge density $\rho_l = 12 \text{ nC/m}$, determine.
 - i) The electric field intensity E at point A(4,-2,3)
 - ii) The value of a point charge Q located at point B(-2,4,1) to cause E_x to be equal zero at point A

Question(2)

- a) Draw two dimensional flux lines due a positive charge + Q and a nearby negative charge -Q.
- b) Derive the two characteristics of the relationship between potential difference V and electric field intensity E at any point. Also write down the voltage gradient equation in spherical coordinates
- c) Find the surface charge density induced at point A(2,5,0) on the conducting plane $z = 0$ if there is a line charge of 30 nC/m located at $x = 0$, $z = 3$.

Question(3)

- a) Write down Maxwell's equations in its point form for static fields, defining each term used.
- b) Using Ampere's circuital law derive mathematical expressions for the magnetic field intensity \mathbf{H} from $\rho = 0$ to $\rho = \infty$ of an infinitely long coaxial transmission line carrying a uniformly distributed total conductor current I in the inner solid conductor and $-I$ in the outer hollow conductor, given that the inner solid conductor radius is a and the hollow outside conductor inner radius is b and its outer radius is c .
Sketch H versus ρ from 0 to ∞
- c) Two parallel plates of a capacitor spaced by three different dielectric materials with relative permittivity 5, 4, 2 and thickness 2, 3, 1 mm respectively. If each plate has an area of 4 cm^2 and the total applied voltage is 500 V, calculate.
 - i) The total capacitance
 - ii) The electric field intensity in each dielectric material
 - iii) The voltage across each dielectric material.
 - iv) The energy stored in each dielectric material.

Question(4)

- a) Aided with clear sketches, derive expressions that determine the perfect dielectric material properties at the surface between two dielectric materials when they are placed in an external electric field using the boundary conditions.
- b) Derive a mathematical expression for self inductance of two parallel conductors
- c) Calculate the force produced on a square loop ABCD carrying current of 2 mA in $z = 0$ plane due to a current carrying conductor of 15 A placed in the y axis ($z = 0$ and $x = 0$), where the coordinates of square loop are: A(1,0,0), B(3,0,0), C(3,2,0), and D(1,2,0)

Good Luck

Prof. M.A.El-Khazendar

IANTIA UNIVERSITY

Course: Energy Conversion

Faculty of Engineering | Final Exam. Jan. 2007-2008 | New-old Curriculum

2nd Year (Dept. Electric Power & Machines Eng.) Time: 3 hours

ملاحظة هامة: لا يجوز الخروج من قاعة الامتحان قبل انقضاء الوقت المحدد للامتحان.

الطلاب: يرجى التأكد من صحة البيانات الشخصية المكتوبة في ورقة الامتحان قبل البدء في الحل.

Attempt all questions

من فضلك لاحظ درجات الأسئلة

Question 1

A linear magnetic system of two coils is shown in shown in Fig. 1. $N_1 = N_2 = \alpha$ turns, $g_1 = 2g_2 = \beta$ mm, and $A = \gamma$ mm². In terms of α , β , γ and others, determine (a) The self and mutual inductances (15 points) (b) the energy stored in the system when both coils are excited. (4 points)

Question 2

The machine shown in the Fig. 2 has three concentrated open-circuited stator coils each of T turns. The coils are arranged symmetrically around the stator. The poles of the rotor are so shaped that the flux distribution around the stator periphery due to the rotor mmf is sinusoidal. The total flux produced by the rotor current is ϕ wb, and the rotor is driven at constant N rpm.

- Derive expression for: (i) the rotor constant angular velocity ω as a function of time t . (2 points)
- For the direction of rotation in the figure and in terms of T , N , ϕ , t and others, derive expressions for (i) $\lambda_{a-a'}$; the flux linkage of coil $a-a'$ and (ii) $e_{a-a'}$; the instantaneous emf induced in it. (12 points)
- Write expressions for $e_{b-b'}$ and $e_{c-c'}$ the instantaneous values of the emfs induced in coils $b-b'$ and $c-c'$ respectively. (2 points)

Question 3

The electrical circuit of a doubly excited cylindrical machine has similar winding on stator and rotor is shown in Fig. 3. The electrical parameters are: stator winding resistance R_s ; stator winding self inductance L_{ss} ; rotor winding resistance R_r ; rotor winding self inductance L_{rr} , and mutual inductance L_{sr} .

- Determine the average torque produced at a rotor angle of 45° when the machine is employed as an actuator with its two windings in series in series, as indicated in the figure and excited from (i) a dc source of 10 volt (ii) an ac source of 115 volt, 60-Hz.
- If the stator were excited from a 60-Hz, and the rotor from a 25-Hz source, at what speed or speeds would the machine be capable of energy conversion? (22 points)

Question 4

- Explain, with illustration diagram, domestic utilization of solar heat energy. (10 points)

- b) Aided with illustration, use the approach referred to in lectures as approach 2 (i.e. representing the phase mmf by a spatial vector) to find the resultant mmf produced by symmetrical three-phase windings supplied by balanced three-phase currents. (10 points)
- c) Given for a wind mill that: Output Power = $2A\rho V(v - v')^2$ and Input power = $0.5 A\rho V^3$ where V is the entering wind velocity, v is the exit wind velocity, ρ is the air density and A is the disc area. derive an expression for the output power at maximum efficiency. Comment on the results in view of the maximum wind speed at which the mill is designed. (6 points)
- d) Draw neatly a figure that shows a cross section of the magnetic system of a four-pole direct current machine illustrating the flux-paths. (7 points)

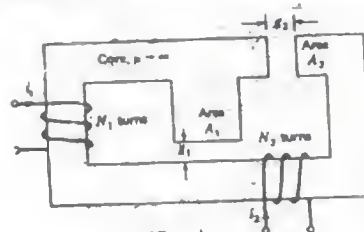


Fig. 1



Fig. 2

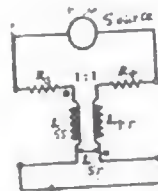


Fig. 3

END OF EXAM

LUCK < GOOD > BYE

Final 2020 Power Electronics and Power Systems (18EE220) 2020-21

TANTA UNIVERSITY

Faculty of Engineering

Power Engineering and Electrical Machines Department

Course : Electromagnetic Fields	Exam : Final
Code : EPM2104	Time : 3 Hours
Year : 2 nd	Department : Power Engineering and Electrical Machines
Date : 21 / 1 / 2009	

ANSWER ALL QUESTIONS

Question(1) (18 Marks, a) = 6 Marks and b) = 12 Marks)

- With full definitions of all terms used, write down the equations of:
 - Lorentz force equation.
 - Maxwell's equations in its integral form.
- In free space, a point charge $Q_1 = 10 \text{ nC}$ is located at $P_1(0,4,0)$ and another point charge $Q_2 = 20 \text{ nC}$ is located at $P_2(0,0,4)$.
 - Find the electric field intensity at the origin.
 - Where should a point charge = 30 nC be located so that the electric field intensity at the origin equals zero.

Question(2) (20 Marks, a) = 8 Marks and b) = 12 Marks)

- Derive an equation of the capacitance of two charged concentric spheres, the radius of the inner and outer spheres are a and b respectively. The inner sphere has a charge Q and the outer sphere has a charge $-Q$.
- Given the potential field $V = 60x^2yz + 30y^2V$ in free space, evaluate at $P(2,1,5)$:
 - The magnitude and direction of the electric field intensity.
 - The electric flux density.
 - The absolute potential.
 - The volume charge density.

Question(3) (24 Marks, a) = 10 Marks and b) = 14 Marks)

- Using Ampere's circuital law derive a mathematical expression for the magnetic field intensity H from $\rho = 0$ to $\rho = \infty$ of an infinitely long coaxial transmission line carrying a uniformly distributed total conductor current I in the inner solid conductor and $-I$ in the outer hollow conductor, given that the inner solid conductor radius is h and the hollow outside conductor inner radius is b and its outer radius is c . Sketch H versus ρ from 0 to ∞ .
- Two spherical concentric conductors with the inner spherical conductor is solid and has radius a and its voltage is V_1 . The outer spherical conductor has inner radius b and outer radius c and it has a voltage V_2 .
Find the charges Q_1 and Q_2 for the following conditions:
 - The two conductors are isolated.
 - Inner conductor is grounded.
 - Outer conductor is grounded.
 - The inner conductor is not charged.

Question(4) (23 Marks, a) = 6 Marks and b) = 17 Marks)

- Derive the self inductance per a unit length of an infinite length conductor having a radius h .
- Calculate the force produced on a square loop (ABCD) carrying a current of 5 mA in $z = 0$ plane due to a current carrying conductor of 10 A placed in the y axis ($z = 0$ and $x = 0$), where the coordinates of the square loop are: $A(1,1,0)$, $B(4,1,0)$, $C(4,5,0)$, and $D(1,5,0)$.

Solve The Following Questions

Question 1 (20 Marks)

a) Derive an expression of line inductance for three phase transmission line with an unequal spacing.

b) Three-phase double circuit are arranged as shown in Figure (1). If the diameter of each conductor is 5 cm, find capacitive reactance to neutral and the charging current per km per phase at 220 kV and 50 Hz, assuming that the line is regularly transposed.

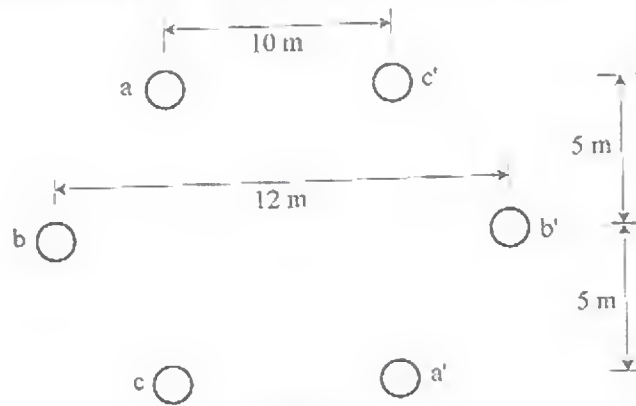


Figure (1)

Question 2 (25 Marks)

a) prove that the long transmission line model is:

$$\begin{bmatrix} V_s \\ I_s \end{bmatrix} = \begin{bmatrix} \cosh \gamma l & Z_c \sinh \gamma l \\ \frac{1}{Z_c} \sinh \gamma l & \cosh \gamma l \end{bmatrix} \begin{bmatrix} V_r \\ I_r \end{bmatrix}$$

b) A balanced 3-phase overhead transmission line has a total series impedance per phase of $200 \angle 80^\circ \Omega/\text{phase}$ and a total shunt admittance of $0.0013 \angle 90^\circ \Omega^{-1}/\text{phase}$. The line delivers a load of 80 MW at 0.8 lagging power factor and 220 kV. Calculate: (i) the ABCD for T-model representation; (ii) the sending end voltage, current and power factor of the line; (iii) the line efficiency and line voltage regulation.

Question 3 (20 Marks)

- a) Compare between aluminum and copper conductors.
- b) An overhead line is supported between two towers 200 m apart having a difference in their levels equal to 10 m. The conductor diameter is 2 cm and weight of 2.3 kg/cm. Calculate the position of minimum point of conductor from each tower if the wind pressure is 57.5 kg/cm^2 of projected area and a factor of safety is 4. The maximum tensile strength of copper is 4220 kg/cm^2

Question 4 (25 Marks)

- a) (i) What are the main types of distribution systems according to scheme of connections?
(ii) What are the main methods used to improve string insulators efficiency?
- b) Define the following terms: (i) Flashover voltage; (ii) Puncture voltage
- c) A DC ring distributor shown in Figure (2) is fed at point A from 250 V supply. The resistances of the various sections (go and return) are indicated in Figure (2). Determine: (i) the current in each distributor sections; (ii) the load voltages; (iii) the distributor efficiency.

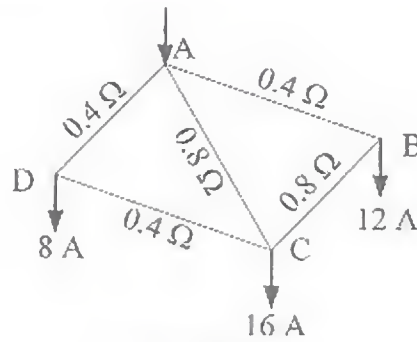


Figure (2)

(With My Best Wishes)

Dr. Ibrahim Bedir

الفصل الدراسي الأول ٢٠٠٨/٢٠٠٩

جامعة طنطا

الفرقة : الثانية كهرباء - قوى

كلية الهندسة

الزمن : ثلاث ساعات

المادة : الهندسة المدنية

أجب على جميع الأسئلة الآتية

السؤال الأول

- أ- أذكر ما تعرفه عن الأشكال التقريبية لسطح الأرض الطبيعي.
- ب- المطلوب تصميم ورسم مقياس تخطيطي لخريطة مقياس رسمها ١ : ٥٠٠٠ بحيث يمكن استخدامه للقراءة إلى اقرب ٢ متر. وضح بالرسم كيف يمكن توقيع خط طوله ١١٦ متر على هذه الخريطة.

السؤال الثاني

- أخذت القراءات الآتية في مشروع ميزانية فكانت كالآتي :
- ١,٥٦ - ٢,٣٦ - ٣,٨٧ - ٠,٨٤ - ٢,١٢ - ٣,١٥ - ٤,٦٢ - ٢,٨٧ - ٣,٢٧ - ١,٢٧ - ٣,٦٤ - ٠,١١ - ٣,١٤ فإذا كانت النقطة الثانية والخامسة والسابعة دوران وكانت القراءة فوق النقطة التاسعة مأخوذة والقامة مقلوبة - أوجد في جدول ميزانية مناسب النقط المختلفة مع إجراء جميع التحقيقات الحسابية الممكنة إذا علمت أن منسوب النقطة الخامسة = ١٠,٥٨ متر.

السؤال الثالث

- يراد مد كابل كهرباء ضغط عالي بين النقطتين أ ، ب فإذا قيست المسافة الأفقية بينهما من خريطة مقياس رسمها ١ : ١٥٠٠ فكانت مساوية ٣١,٢ سم وكان عدد الأبراج المستخدمة لمد الكابل هو سبعة أبراج وجميعها بنفس الارتفاع وكان سطح الأرض يحيل بزاوية ثابتة بين النقطتين = ٨° أو وجد طول الكابل الحقيقي الذي يجب صرفه من المخازن إذا علمت أن سهم الترخيم في منتصف المسافة بين كل برجين = ٨% من المسافة الأفقية بينهما.

مع تمنياتي بالتوفيق

د. حافظ عباس عفيفي

السؤال الأول:-

وضح بانرسومات المتقنة وكافة البيانات على الرسم كلا مما يأتي:

- دورة انتقال الأحمال من المنشأ الى التربة.
- الأنواع المختلفة للأساسات السطحية.
- شكل توزيع الاجهادات داخل التربة خلال مستوى رأسى يمر بمنتصف الأساس.
- بعض الأسباب التى تؤدي لحدوث ظاهرة الهبوط النسبى فى المنشآت.
- الأسباب التى تؤدي لاعتماد الأساسات العميقة كنظام للتأسيس بدلا من الأساسات السطحية.

السؤال الثانى:-

- ماهى التربة، وكيف تكونت؟
- ماهى أهم الفروق بين التربة المتماسكة والتربة الغير متماسكة؟
- أذكر أمثلة على بعض أنواع التربة المتماسكة والغير متماسكة.
- كيف يمكن تصنيف التربة طبقا لنقطر حبيباتها؟
- أذكر باختصار أهم أسباب توند الاجهادات داخل التربة.

السؤال الثالث:-

- أذكر ما تعرفه عن التربة ذات المشاكل.
 - أذكر أنواع الهبوط الذى يحدث للتربة أسفل المنشآت.
 - "الهبوط الكلى أكثر خطورة على المنشأ من الهبوط النسبى" تحقق من صحة هذه العبارة مع التعليل.
 - المطلوب حساب قيمة الاجهادات الكنية المتولدة فى كابل كهربائى نتيجة لحمل مركز مقداره ٨٠ طن يؤثر بمنتصف قاعدة أبعادها ١,٠ x ١,٠ متر تقع على سطح الأرض، اذا علمت أن السطح العلوى للكابل يقع على عمق ٤ أمتار أسفل الأساس وأن وزن وحدة الحجوم للتربة الموجود بها الكابل هو ١,٩ طن / م^٣
- ملحوظة: استخدم الطريقة التقريبية لحساب الاجهادات الناتجة عن الحمل المركز.

أطيب الأمنيات بالنجاح والتفوق
د. أحمد فاروق

Question 2 [45 Mark]

2-a) Find the value of y at $x=2.6$ by using modified Euler's Methods with $h=0.2$, if $y=\sqrt{x^2+4y^2}$, $y(2.2)=1.5$

2-b) Compute numerically the first two rows of the solution of the wave equation

$$\frac{\partial^2 u}{\partial t^2} = 4 \frac{\partial^2 u}{\partial x^2}, \quad 0 \leq x \leq 1, \quad t \geq 0, \quad \text{take } h=0.2, k=0.05$$

with the boundary and initial conditions

$$u(0,t)=u(1,t)=0$$

$$u(x,0)=\sin \pi x, \quad \frac{\partial u}{\partial t}(x,0)=0$$

2-c) Using Gauss - Seidel Method, solve the system of linear equations

$$5x_1 - x_2 + 3x_3 = -2, \quad x_1 + 5x_2 - 2x_3 = 10, \quad 2x_1 - 4x_2 + 10x_3 = 6$$

2-d) Use the finite difference method with $n=4$ to

approximate the solution of the boundary - value problem $y'' + 6.55(x+1)y = 1$, $y(0)=0$, $y(1)=0$

جامعة طنطا
كلية الهندسة
قسم الميكانيكا والرياضيات الهندسية
المادة : رياضيات هندسية (٢)
المرحلة : الثانية (المسؤول + قرى كورسية)
الوقت : ١٢٨ : ١٠ : ٢٠ (الفصل الأول)
تاريخ الإمتحان : ٢٠٠٩ / ١١

Answer the questions [85 Mark]
Question 1 [40 Mark]
1-a) Fit the readings

x	1.00	1.25	1.5	1.75	2.00	2.25
y	1.12	0.92	0.75	0.61	0.51	0.42

for the exponential curve $y = be^{ax}$

1-b) In an examination the number of students who obtained marks between certain limits were as follows :

Marks	0 - 19	20 - 39	40 - 59	60 - 79	80 - 99
No. of students	41	62	65	50	17

Estimate the number of students who obtained less than 70 marks.

1-c) Evaluate $\int_4^{3.2} \ln x \, dx$ correct to 6 decimal by using Simpson's Rule.

1-d) Obtain the estimate of the missing figures in the following table

x	2.0	2.1	2.2	2.3	2.4	2.5	2.6
f(x)	0.135	--	0.111	0.100	--	0.082	0.074

المقرر : الهندسة الميكانيكية
الفترة : الثانية كورس (وقت)
الدرجة : ٣ ساعات

جامعة صيدا
كلية الهندسة
التمهيد الهندسي الأول
لعام ٨-٩ / ٩-١٠

١- استخدم الرسم لملأ الأسئلة ذيل

أجب عن الأسئلة الآتية :-

السؤال الأول

- ١- ٢- اشرح مع الرسم التقاطع الكهربائي والحراري؟ ثم استنتج معادله
التوصيل الحراري خلال البسطوانات متحدة المركز؟
٣- يعتبر المانومتر المائى *Inclined tube manometer* تقيس
٤- *U-tube manometer* اشرح ذيل مع الرسم؟
٥- اشرح مع الرسم كل من :-

- ١- أنبوب بيتو (*Pitot tube*) ٢- الميخنة الريو رايكس والميخنة البيزو ديناميكية
٣- أنبوب بنجا - قفزه انحراف 0.12 m وضد بليقة من سيليكا الكالسيوم
 $k = 0.089\text{ W/m.K}$ وسمكها 20 mm فإذا كانت درجات حرارة السطح الداخلي والخارجي
للطبقة العازلة هما $T_{s1} = 800\text{ K}$ و $T_{s2} = 490\text{ K}$ على التوالي .
أجب عن السؤال الآتي لوصف العمل مع الأنبوب .

السؤال الثاني

- ١- اذكر توصيف وتصنيف محركات الاحتراق الداخلي؟ ثم اشرح مع رسم متقنة تقنيته الدفوع لكل
من محركات البنزين ودرجات الديزل؟
٢- اشرح مع الرسم قطع هندسة محرك احتراق داخلي من نوع الاحتراق؟ بوضوح كيف يعمل؟
٣- يعتبر التجريب بالهواء أفضل من التجريب بالغاز للمحركات من ناحية الصيانة. اشرح ذيل؟
٤- محرك سيارة احتراق بالبنزين رباعي الاسطوانات يولد قدره فعاله 94 kW
عند سرعة 2000 r.p.m وإذا كان المحرك ذو ٦ اسطوانات فتردد اسطوانته
الواحد 80 mm وطول اسطوانته 108 mm أجب :-

- ١- حجم اسطوانته
- ٢- سرعة المحرك
- ٣- الضغط المنخفض الفعال
- ٤- الكفاءة

السؤال الثالث

- ١- استرجم كيف تؤثر كثافة السكينة على القدرة القصوى لمحركات الاحتراق الداخلي؟
- ٢- اذكر ما نفعه عند صياغة واختبار دورة الموتور من محركات الديزل؟
- ٣- استرجم مع الرسم تجربة عملية لاختبار أداء محركات الاحتراق الداخلي؟
- ٤- متفوهة متفلة كلفظ 40 kg وسرعة الابتدائية 12 m/sec . إفرادت سرعة 31 m/sec وازداد ارتفاعه كذا إلى 43 m . استخرجت المتفوهة خلال هذا الإجراء 25000 J من الحرارة و 4800 J من الشغل . أعطيت المتفوهة 0.002 kWh (كبلوات ساعة) على شكل طاقة كيميائية . أصب السبب في الطاقة الداخلية للمتفوهة .

السؤال الرابع

- ١- اذكر مائتين عشرين :-
- ٢- الفضة المتوفرة البياض في - الدفعة المستقرة والفضة المستقرة
- ٣- اجوبة بور دور
- ٤- عرف ظاهرة التفرغ للمفحات ؟ ثم استرجم الرسم الاستعمالات الأساسية للمفحات ؟
- ٥- استخرج معادله برنولي لادبوج سريان مستقر من سائل حقيقي ؟ ثم استرجم مع الرسم التمثيل الهندسي لمعادله برنولي ؟
- ٦- استخرج الصيغة الرياضية لقانونه الأول للديناميكا الحرارية ؟ ثم استرجم الصيغة الرياضية للقانون الثاني للمفحات ؟
- ٧- برقد تتركس أجود على شكل متوازي مستطيلات ذو أبعاد داخلية 76 cm x 61 cm x 46 cm
- ٨- رابطة الخارجية 81 cm x 66 cm x 51 cm
- ٩- اوجد القدرة الداخلية لموتور بالواط الوزنه لأهداف حاله الاستقرار . نحاصل الحرارة المنقودة لأرقام وخواص الموتور مع العلم أنه درجة حرارة الجدران الداخلية والخارجية 204 °C ، 38 °C على التوالي دائم مصنوعة من مادة الأسبستوس . الموصلية الحرارية له ($0.166 \text{ W/(m} \cdot \text{K)}$)

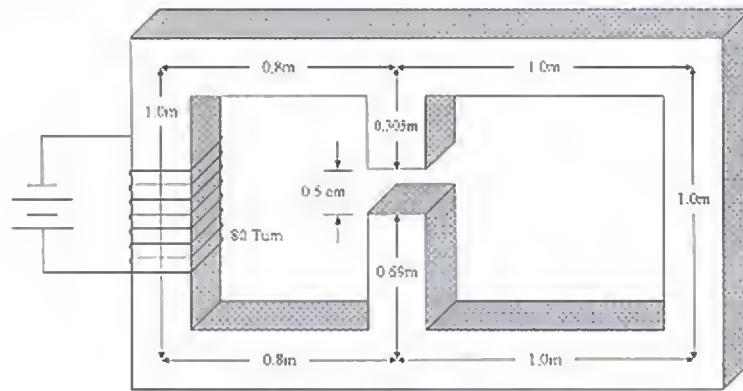


Attempt All Questions

Question 1:

Marks: [18]

- a- Distinguish briefly between the following pairs of quantities: [8]
- 1- Renewable and non-renewable energy resources
 - 2- Energy and co-energy
 - 3- Self and mutual inductances
 - 4- Electromotive force and magnetomotive force
- b- Determine the voltage that must be applied to the coil shown in figure to produce a flux density of 0.2T in the airgap. The coil resistance is 2.05Ω . The core cross section is 0.04m^2 . Neglect fringing and losses. [10]

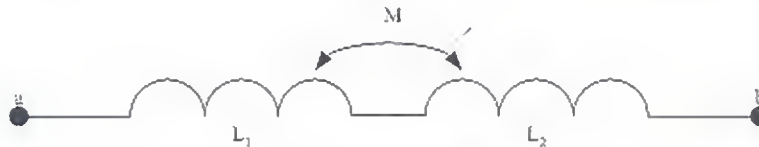


Magnetic circuit of Q1-b

Question 2:

Marks: [18]

- a- Show that the two coupled coils shown in figure can be replaced by a single coil having an inductance of $L_{ab} = L_1 + L_2 \pm 2M$. Show the possible dot marks positions where the third term has negative sign. [8]



Circuit of Q2-a

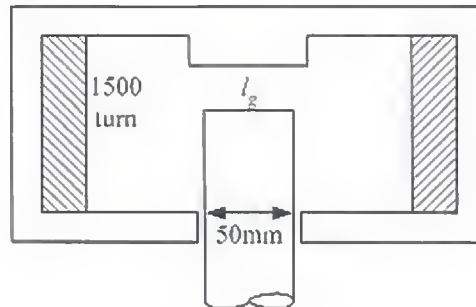
- b- When two coils are connected in series, their effective inductance is found to be 10.0H. However, when the connections to one coil are reversed, the effective inductance is 6.0H. If the coefficient of coupling is 0.6, calculate the self inductance of each coil and the mutual inductance. [10]

Question 3:

Marks: [18]

- a- In the scope of your experimental study, show how you can obtain the hysteresis loop for a certain magnetic material. Draw the equivalent circuits and state the necessary equations. What are the factors affecting the area of hysteresis loop and hysteresis losses. [8]

- b- A plunger relay is shown in the diagram. When it is energized the current remain constant [10]
at 2.0A and the plunger moves such that the airgap is reduced in length from 20mm to
10mm. If losses may be neglected, calculate the average force experienced by the plunger
and the energy taken from source. The airgap at the hole through which the plunger
armature moves may be neglected.

**Question 4:****Marks: [18]**

- a- Drive an expression for the magnetomotive force produced by symmetrically distributed windings [8]
with 120 shift in space when excitation with balanced three phase currents.
- b- Find the values of main dimensions of a 1000KVA, 50Hz, 370rpm, three phase generator. The [10]
specific magnetic loading is 0.55 Wb/m^2 and the specific electric loading is 28000 AC/m. Assume
winding factor 0.955. The axial length is twice the pole pitch (L/τ).

Question 5:**Marks: [18]**

- a- Derive an expression for the voltage induced on a coil of T turns under sinusoidal variation of flux. [6]
The flux maximum value is ϕ with frequency f .
- b- Calculate the pitching and distribution factors for a three phase machine with 96 stator slot, [6]
6 poles and coil span 1 to 12.
- c- Calculate the loss of energy caused by hysteresis in one hour in 50Kg of iron if peak density [6]
reached is 1.3 Wb/m^2 and the frequency is 25Hz. Assume Steinmetz index is 1.6 and
hysteresis loss coefficient as 628 J/m^3 . Density of iron $7.8 \times 10^3 \text{ Kg/m}^3$.

With Best Wishes

المادة : رياضيات هندسية (أ)
الفرقة : ثانية قوى كهربائية (لائحة قديمة)
تاريخ الإمتحان : ٢٠٠٩ / ١ / ١٧

جامعة طنطا
كلية الهندسة
قسم الفيزيكا والرياضيات الهندسية

Answer the following Questions

1-a) If a car is traveling along a straight road with constant speed $v = b_1$ [m/sec.], its position y [m] at time t [sec.] is $y = b_0 + b_1 t$. Suppose that measurements are

t	0	3	5	8	10
y	200	230	240	270	290

Fit a straight line to these data by least squares and estimate from it the speed .

1-b) Given the data

x	0.1	0.2	0.3	0.4	0.5
y = f (x)	0.70010	0.4016	0.1081	- 0.1744	- 0.4375

Find an approximate value of the zero of $f (x)$ between 0.3 and 0.4

1-c) Obtain the estimate of the missing figures in the following table

x	2.0	2.1	2.2	2.3	2.4	2.5	2.6
f(x)	0.135	--	0.111	0.100	--	0.082	0.074

2-a) Evaluate $I = \int_0^1 e^{-x^2} dx$ by Simpson s Rule with $n = 10$

2-b) Find the value of y at $x = 2.6$ by using modified Euler s Methods with $h = 0.2$, if $y = \sqrt{x^2 + 4y^2}$, $y (2.2) = 1.5$

2-c) Apply Runge – Kutta Method to find an approximate value of y when $x = 0.2$ given that

$$\frac{dy}{dx} = x + y , y = 1 \text{ when } x = 0 \text{ (take } h = 0.1)$$

Answer the following questions:

- 1- a- Find the Z- parameters of the T-network that has $Z_a = 8 \Omega$, $Z_b = 10 \Omega$, and $Z_c = 12 \Omega$.
b- Find the ABCD parameters of the ideal transformer that has turns ratio of 10 : 4.
c- Find the input impedance of the ideal transformer that is given in (1-a) when it is loaded by a capacitor of 10 micro Farad.

- 2- a- Find the Y-parameters of the π -network that has $Y_1 = 0.4 \text{ mho}$, $Y_2 = j 0.4 \text{ mho}$, and $Y_3 = -j 0.3 \text{ mho}$.
b- A Common Emitter Amplifier has the parameters, $h_{re} = 0$, $h_{ie} = 200 \Omega$, $h_{fe} = 100$, and $h_{oe} = 100 \mu \text{ mho}$. Also $R_E = R_L = R_C = 800 \Omega$, $R_1 = 1.3 \text{ k} \Omega$, $R_2 = 2.7 \text{ k} \Omega$, $R_S = 2 \text{ k} \Omega$, and $C_E = C_j = C_o = 20 \mu \text{ Farad}$. Calculate the input impedance, voltage gain, and the current gain.

- 3-a- Show how you could use the operational amplifier to integrate the following inputs:

$$V_a = 5 \sin \omega t, \quad V_b = 5 \text{ V}, \quad V_c = 5$$

- b- A five bits A/D converter with resolution 0.5, and $R_F = 0.35 \text{ LSB resistance}$. Determine the output voltage when the input voltage is "11010".

- 4 - Draw the logic circuit of the following functions, and minimize them,

$$F_1 = C + AB\bar{C} + AB$$

$$F_2 = ABC\bar{D} + A\bar{B}C\bar{D} + AB\bar{C}\bar{D} + A\bar{B}\bar{C}\bar{D}$$

- 5- a- Simplify the functions:

$$F_1 = \sum (0, 1, 2, 3, 4, 6, 7, 8, 12, 13)$$

$$F_2 = \bar{A}BC + \bar{A}B\bar{C} + A\bar{B}\bar{C} + A\bar{B}C$$

$$F_3 = \bar{A}C + \bar{A}B + A\bar{B}C + BC$$

- b- Compare between calculating the value of the following function as Sum of Products and as Product of Sum;

$$F = \bar{A}\bar{B} + \bar{A}B + A\bar{B} + AB$$

Answer the following five questions:

Q(1): For the circuit in Fig. Q1:

a) Prove that $V_o = \frac{R_b}{R_a} (V_a - V_b)$ when $\frac{R_a}{R_c} = \frac{R_b}{R_d}$

b) For $\frac{R_a}{R_b} = \frac{R_c}{R_d} = \frac{2}{5}$, $V_b = 4.0$ V and $V_{cc} = 15$ V.

what range of values for V_a will result in linear operation?

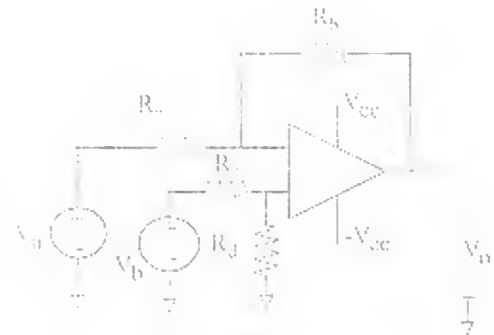


Fig. Q1

Q(2): The voltage pulse described by the following equations is impressed across the terminals of $0.5 \mu\text{F}$ capacitor:

$$V(t) = 0 \quad t \leq 0$$

$$V(t) = 5t \quad 0 \leq t \leq 4$$

$$V(t) = 20 e^{-(t-4)} \quad 2 \leq t \leq \infty$$

- Derive the expressions for the capacitor current, power, and energy.
- Specify the interval of time when energy is being delivered by the capacitor.

Q(3): a) Deduce the current response for an RL circuit with step voltage source.

b) The current source in the circuit generates the current pulse shown in Fig. Q3.

There is no energy stored at $t = 0$.

1- Derive the numerical expressions for $v(t)$

for the time intervals $t < 0$, $0 < t < 50 \mu\text{s}$, and

$50 \mu\text{s} < t < \infty$

2- Calculate $v(50^+ \mu\text{s})$ and $v(50^- \mu\text{s})$



Fig. Q3

(انظر الصفحة التالية)

Q(4): The switch in the circuit shown in Fig. Q4 has been in position a for a long time. At $t = 0$ the switch is thrown to position b. Find

- $V_c(t)$ for $t \geq 0$
- $i(t)$ for $t \geq 0^+$

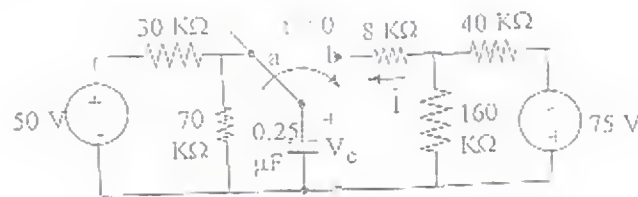


Fig. Q4

Q(5): The initial energy stored in the circuit in Fig. Q5 is zero. At $t = 0$, a dc current source of 20 mA is applied to the circuit.

- What is the initial value of I_L and dI_L/dt ?
- What is the numerical expression for $I_L(t)$ when $t \geq 0$?

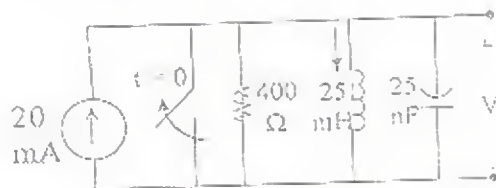


Fig. Q5

مع أطيب الأمنيات بالتوفيق والنجاح

Tanta university
Faculty of engineering
Electrical Power and Machine Dept.
A course of Power System (1)

Final Term Exam
2nd Year
2008-2009
Allowable Time: 3 H

Solve The Following Questions

Question 1 (25 Marks)

a) **Define** The following terms and state the factors that affect each one:

- (i) Skin Effect
- (ii) Ferranti Effect.

b) A balanced 3-phase overhead transmission line has a total series impedance per phase of $200\angle 80^\circ \Omega/\text{phase}$ and a total shunt admittance of $0.0013\angle 90^\circ \Omega^{-1}/\text{phase}$. The line delivers a load of 80 MW at 0.8 lagging power factor and 220 kV. Calculate: (i) the ABCD for T-model representation; (ii) the sending end voltage, current and power factor of the line; (iii) the line efficiency and line voltage regulation.

Question 2 (20 Marks)

a) **Derive an expression** of line inductance for three phase transmission line with an unequal spacing.

b) Three-phase double circuit are arranged as shown in Figure (1). If the diameter of each conductor is 5 cm, find capacitive reactance to neutral and the charging current per km per phase at 220 kV and 50 Hz, assuming that the line is regularly transposed.

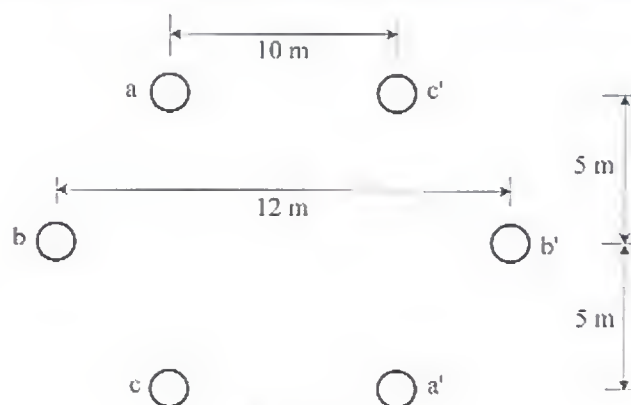


Figure (1)

Question 3 (25 Marks)

- a) (i) **What are the main types of distribution systems according to scheme of connections?**
- (ii) **What are the main methods used to improve string insulators efficiency?**
- b) **Define the following terms: (i) Flashover voltage; (ii) Puncture voltage**
- c) A DC ring distributor shown in Figure (2) is fed at point A from 250 V supply. The resistances of the various sections (go and return) are indicated in Figure (2). **Determine: (i) the current in each distributor sections; (ii) the load voltages; (iii) the distributor efficiency.**

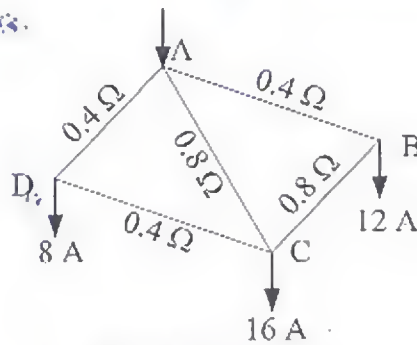


Figure (2)

Question 4 (20 Marks)

- a) **Compare between aluminum and copper conductors.**
- b) An overhead line is supported between two towers 200 m apart having a difference in their levels equal to 10 m. The conductor diameter is 2 cm and weight of 2.3 kg/cm. **Calculate the position of minimum point of conductor from each tower if the wind pressure is 57.5 kg/cm² of projected area and a factor of safety is 4. The maximum tensile strength of copper is 4220 kg/cm²**

(With My Best Wishes)

Dr. Ibrahim Bedir

بسم الله الرحمن الرحيم
التاريخ : 2009 /1/28
الزمن : ساعتان

المادة/ اقتصاد هندسى
(EP21H2)
الفرقة الثانية (لائحة قديمة)

جامعة طنطا
كلية الهندسة
قسم القوى الكهربائية

أجب عن الأسئلة الآتية:- (30 درجة)

المسائل الأولى:-

- 1- " هناك العديد من أنواع التكاليف تستخدم فى الاقتصاد الهندسى عند تحليل الجدوى المالية للمشروعات الصناعية " تكلم بالتفصيل عن أنواع التكاليف.
- 2- تكلم عن أهم الخطوات الرئيسية للدراسة الاقتصادية .
- 3- اشرح بالتفصيل العناصر الأساسية لتصنيع منتج ما.

المسائل الثانية:-

- 1- ما هي العناصر الأساسية لتكلفة منتج ما.
- 2- ما أهمية دراسة الجدوى الفنية للمشروعات- مع شرح لأهم المسائل التى تعالجها دراسات الجدوى الفنية.
- 3- اشرح بالتفصيل أهم مراحل المفاضلة بين المشروعات.

مع أطيب التمنيات بالنجاح
أ.د/ عبد الفتاح مصطفى خورشيد



مفاتيح - كورس - صميم
محول الطاقة

Attempt All Questions

Question ١:

- ١- A series magnetic circuit consists of a permanent magnet, a steel material with assumed infinite permeability and an air gap. Derive the necessary condition to minimize the volume of the permanent magnet for a desired value of the flux density in the airgap.
- ٢- Show that the two coupled coils shown in Fig. ١ can be replaced by a single coil having an inductance of $L_{ab} = L_1 + L_2 \pm 2M$. Show the possible dot marks positions where the third term has negative sign.

Question ٢:

- ١- For a singly-excited translational magnetically linear electro-mechanical energy system, derive an expression for current, flux linkage and force in terms of stored energy and coenergy.
- ٢- Fig. ٢ shows a solenoid where the core cross section is square.
 - i. For a coil current of I (DC), drive an expression for the force on the plunger.
 - ii. Let the coil have a resistance R and be excited by a voltage of $v(t) = V_m \sin(\omega t)$. For a displacement g between the plunger and the pole. Determine the steady state coil current and mechanical force.

Question ٣:

- ١- For two magnetically coupled coils, show that the total stored energy W_f is given by:

$$W_f = \frac{1}{2} L_{11} I_1^2 + \frac{1}{2} L_{22} I_2^2 + M I_1 I_2$$

- ٢- a) For a doubly excited rotating magnetically linear electromechanical energy system with cylindrical stator and salient rotor, sketch the space variation of self and mutual inductances.
- b) In a doubly excited rotating system both the rotor and stator self inductances are assumed constants. The mutual inductance is a cosinusoidal function of the angular position. The two windings are connected in series and carry a current $i_1 = 5\sqrt{2} \sin(\omega t)$. Drive expressions for the average and peak values of the torque acting on the rotor that rotates with an angular speed ω rad/sec.

Question ٤:

- ١- Write notes on the following:
 - a- conversion of solar energy into electrical energy

b- utilization of geothermal energy for electricity generation

γ- For an AC excited single phase distributed windings of γ slots:

- i- Deduce graphically the space distribution of the resultant mmf.
 - ii- Explain the nature of the MMF produced, then
 - iii- Show that this MMF can be viewed as the resultant of two rotating MMFs in opposite directions.
-

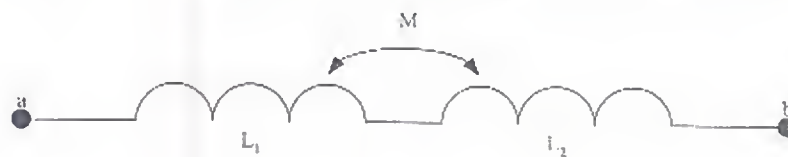


Fig. 1

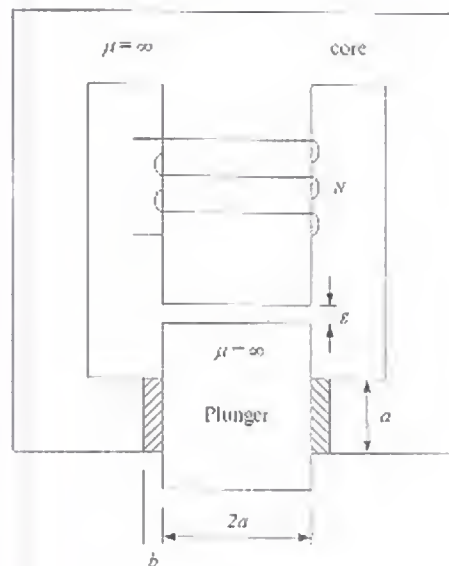


Fig. 2

With Best Wishes



Final EXAM 2009/2010 - First Term

Course	Energy Conversion (EPM2106)	Time Allowed	3 hours
Students	2nd Year (Electrical Power and Machines)	Total Mark	90
Date	Sat. 23 rd January, 2010	Number of pages	4

Attempt ALL the following questions and problems:

- Clarify your answer with the suitable sketches as you can.
- Assume any missed data reasonably.

The first question (15 marks)

Choose the correct answer/answers for the following statements. It is sufficient to write down the question number followed by your choice/choices in your answer sheet:

1.	Higher magnetic permeability leads to A) higher inductance B) lower inductance C) more flux leakage D) lower iron losses
2.	Iron losses depend on A) electric supply frequency only B) flux level only C) area of hysteresis loop of the material only D) all the of the above choices
3.	Compared with magnetic materials, permanent magnetic material has higher values of A) magnetic field intensity (H) B) flux density (B) C) relative permeability (μ_r) D) current
4.	Mutual inductance between two coils increases with increase of: A) angle between their axes B) distance between them C) their currents D) none of the above choices
5.	For mutually coupled coils, if currents are both entering at the dot-marked terminals, coil fluxes A) are additive B) are subtractive C) increase D) cancel each other
6.	For ideally coupled coils, coupling coefficient is A) zero. B) unity C) infinity D) between zero and unity

7.	The stored energy in magnetically coupled coils <u>does not</u> depend on A) coupling coefficient between coils. B) angle between coils C) direction of motion D) direction of currents
8.	For dc excitation, induced emf is A) always zero B) only transformer voltage C) both speed and transformer voltages D) only speed voltage
9.	A rotating system with salient stator and rotor, electromechanical energy conversion is possible if: A) only stator winding is excited. B) only rotor winding is excited. C) both stator and rotor windings are excited. D) either stator or rotor winding is excited.
10.	For a rotating system with salient stator and cylindrical rotor: A) only stator self inductance is function of rotor position B) rotor self inductance is NOT a function of rotor position C) both rotor self inductance and mutual inductance are functions of rotor position D) all inductances (self and mutual) are functions of rotor position
11.	A rotating system with ac excitation for stator and dc excitation for the rotor is called a A) reluctance machine B) synchronous machine C) induction machine D) dc machine
12.	A two-phase winding excited from a two-phase gives A) a single rotating mmf B) two rotating mmfs with anti-direction C) stationary mmf D) pulsating mmf.
13.	Renewable sources of energy has the advantage of A) low running cost B) low initial (capital) cost. C) cheap equipments D) continuous availability
14.	To obtain higher voltages, solar cells are connected A) in parallel B) in series C) in series-parallel combination D) with a battery of higher voltage
15.	The most effective quantity on the available mechanical energy at shaft of a wind turbine is: A) air density B) turbine diameter C) wind speed D) turbine power coefficient

The second question (10 marks)

Which of the following statements is correct? You can write down in your answer sheet the question number followed by either ✓ or X mark.

1.	Inductance of a coil increases with increase in magnetic reluctance of its core.
2.	For a linear magnetic system, coil inductance does not depend on its current
3.	Motional (speed) voltage increases with increasing supply frequency
4.	Mutual inductance between two coils depends on their self inductances
5.	For linear magnetic system stored energy equals co-energy.
6.	Direction of electromagnetic torque is to increase inductance
7.	Transformer voltage depends on coil inductance variation with position.
8.	The mutual inductance between two magnetically coupled coils <u>must be</u> lower than the smaller self inductance of each coils
9.	For doubly excited rotating system, it is necessary to have some saliency for possible electromechanical energy conversion.
10.	Distributed winding provides more sinusoidal mmf space variation

The third question (22 marks)

1.	Discuss what is meant by magnetic flux leakage and fringing in the magnetic circuits; then show how to minimize them. (4 marks)
2.	With the aid of BH curve of a permanent magnet material show: a) the effect of air gap length on the position of the operation point b) the point of maximum energy product (4 marks)
3.	Explain the dot convention employed to determine the polarity of the mutually induced voltages. Then show how it can be determined experimentally. (4 marks)
4.	For a singly-excited rotating electromechanical energy converter, derive a relation for the developed torque in terms of both stored energy and co-energy. (5 mark)
5.	With the aids of current-flux linkage curves, derive how to determine energy converted into mechanical motion from a certain position to another. (5 marks)

The fourth question (28 marks)

1.	For a doubly-excited electromechanical energy conversion device of cylindrical stator and rotor: a) Sketch the space variation of self and mutual inductances. (2 marks) b) Derive a general expression for the electromagnetic torque acting on the rotor. (6 marks) c) Show all the possible electrical machines can be obtained. (2 marks)
2.	Show the MMF space distribution a dc-excited coil of uniform air gap, if the conductors are : a) concentrated b) distributed in 8 slots (4 in each side). Which of the two cases are preferred? Why ? (4 marks)

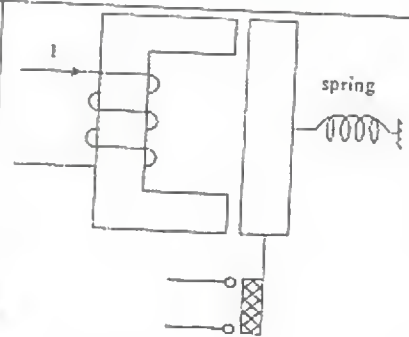
3. Both analytically and graphically, show that balanced three-phase windings excited by balanced three-phase currents, produce a single rotating MMF wave. (4 marks)
4. Give brief notes on advantages and disadvantages of renewable sources of energy. (4 marks)
5. Using suitable clarifications of sufficient data, show the following: (6 marks)
 - a) Solar cell characteristics
 - b) Wind turbine characteristics
 - c) Components of a photovoltaic generating system.
 - d) A wind-energy-based generating system.

The fifth question (15 marks)

1. The relay shown in figure has mean core length of 40 cm. The air-gap lengths are 2 mm each. The coil has 1000 turns. The core is made of a steel having B-H relation given in the following table:

H (AT/m)	400	500	700	900	1100	1400
B (T)	0.4	0.6	0.8	1.0	1.1	1.2

A flux density of 0.9 Tesla is required to actuate the relay. Find the necessary coil current. (5 marks)



2. The self and mutual inductances of two exciting coils of a multiply-excited translational system are:

$$L_{11} = L_{22} = \frac{3.6}{1+2x} \quad \text{and} \quad L_{12} = L_{21} = \frac{1.8}{1+2x}$$
 The two coils are connected in series to a voltage supply of $100 \cos(314t)$. If the displacement x is held at 40 cm, find
 - a) current (as a time expression) (5 marks)
 - b) average force (5 marks)

Good Luck and best wishes
Prof. Essam Eddin M. Rashad

Course Title: Civil Engineering
Date: February 1, 2010 (First term)Course Code: CSE 2155
Allowed time: 3 hrsYear: 2nd
No. of Pages: (2)Remarks: (answer all the following questions, and assume any missing data)
(answers should be supported by sketches)السؤال الأول (١٥ درجة)

- أ- أذكر أنواع مقاييس الرسم المختلفة ثم وضع مزايا مقاييس الرسم التخطيطية عن غيرها. (٥ درجات)
- ب- المطلوب تصميم ورسم مقياس رسم تخطيطي ١ : ١٠٠٠ يتراً مباشرة إلى اقرب ١,٥ ذراع معماري ثم بين عليه خطا طوله ١٤٥,٥ ذراع معماري - وضع بالرسم مستخدماً الفرجار كيف يمكن تعيين طول الخط أب في الطبيعة إذا كان طوله في الخريطة مساوياً ٦,٩ سم. (١٠ درجات)

السؤال الثاني (١٥ درجة)

- أ- وضع بالرسم فقط اشكال روبيرات الدرجة الأولى والثانية المثبتة في الحائط. (٥ درجات)
- ب- أخذت القراءات الآتية في مشروع ميزانية فكانت كالآتي :
- ١,١٩ - ٢,٣٦ - ٣,٧٨ - ٠,٨٤ - ١,٣٣ - ٣,١٥ - ٤,٠٦ - ٢,٨٧ - ٣,٤٥ - ١,٣٦ - ٢,٦٥ -
- ٢,٨٦ - ٣,٦٧ - ٠,١١
- إذا كانت القراءات الثالثة والسادسة والثامنة مقدمات وكانت القراءة فوق النقطة التاسعة مأخوذة والقائمة مقلوبة - أوجد في جدول ميزانية مناسب النقاط المختلفة مع إجراء جميع التحقيقات الحسابية الممكنة إذا علمت أن منسوب النقطة الرابعة = ٤,٦٨ م. (١٠ درجات)

السؤال الثالث (١٥ درجة)

يراد توقيع النقطة ب التي تبعد عن نقطة أ المعلومة مسافة أفقية مقدارها ٤٦٥,٢٦ متر فإذا كان سطح الأرض الطبيعي يأخذ انحداراً منتظماً في اتجاه أ ب بزاوية قدرها ١٠ درجات إلى أعلى وكان الطول الاسمي للشريط المستخدم لتوقيع نقطة ب يساوي ٥٠ متر و الطول الحقيقي له يساوي ٤٨,٧٢ متر وكانت درجة الحرارة أثناء القياس تساوي ٥٥ درجة فهرنهايت. أوجد طول المسافة المائلة التي يجب قياسها على سطح الأرض الطبيعي لتوقيع مكان النقطة ب في مكانها الصحيح.

مع تمنياتي بالتوفيق
د. حافظ عباس عفيفي

Course Title: Civil Engineering
Date: January 2010 (First term)Course Code: CSE2155
Allowed time: 3 hrsYear: 2nd Electrical Eng.
No. of Pages: (1)

- Assume any missing data
- Answers should be supported by sketches

الورقة الثانية (25 درجة)السؤال الأول:- (7 درجات)

(1 درجة)

أ- عرف التربة موضحا كيف تكونت؟

(1 درجة)

ب- ماهي أهم الفروق بين التربة المتماسكة والتربة الغير متماسكة؟ أذكر أمثلة على بعض أنواع تلك التربة.

(1 درجة)

ت- أذكر أمثلة على بعض أنواع التربة ذات المشاكل موضحا الاضرار التي تنشأ عند التأسيس عليها.

(1 درجة)

ث- وضح كيف يمكن تصنيف التربة مستعينا بمنحنى التدرج الحبيبي وقطر حبيباتها ؟

(1 درجة)

ج- أذكر باختصار أهم أسباب تولد الاجهادات داخل التربة.

(1 درجة)

ح- ما هي أهم الشروط التي يجب أن تتحقق في الأساسات لضمان سلامة المنشآت.

(1 درجة)

خ- أذكر أهم الطرق المتبعة في تنفيذ الخوازيق.

السؤال الثاني:- (8 درجات)

وضح بالرسومات المتقنة وكافة البيانات عنى الرسم كلا مما يأتي:

(2 درجة)

أ- دورة انتقال الأحمال من المنشأ الى التربة.

(2 درجة)

ب- الأنواع المختلفة للأساسات السطحية.

(2 درجة)

ت- شكل توزيع الاجهادات أسفل الأساسات المرنة وكذلك الجاسنة.

(2 درجة)

ث- بعض الأسباب التي تؤدي لحدوث ظاهرة الهبوط النسبي في المنشآت.

السؤال الثالث:- (10 درجات)

(1 درجة)

أ- أذكر أنواع الهبوط الذي يحدث للتربة أسفل المنشآت.

(1 درجة)

ب- "الهبوط الكلي أكثر خطورة على المنشأ من الهبوط النسبي" تحقق من صحة هذه العبارة مع التعليل.

(1 درجة)

ت- ما هي قيم الهبوط الكلي والهبوط النسبي المسموح بها للأساسات طبقا للكود المصرى لتصميم الاساسات.

ث- اذا علمت أن السطح العلوى لكابل كهربائى، يقع على عمق 3 أمتار أسفل سطح الأرض،

فالمطلوب حساب قيمة الاجهادات الكلية المتولدة على سطح الكابل نتيجة حمل مركز مقداره

40.0 طن يؤثر بمنصف قاعدة برج كهربائى أبعادها 2.5 x 2.5 متر مزعم انشاؤها على

سطح الأرض أعلى الكابل وذلك اذا علمت أن وزن وحدة الحجم للتربة هو 1.75 طن / م³.

وما هي المسافة الأفقية التي يجب أن يبعد بها الكابل عن منتصف المكان المحدد للقاعدة حتى

(7 درجة)

يتلاشى تأثير الحمل المنقل إلى من البرج.

ملحوظة: استخدم الطريقة التقريبية لحساب الاجهادات الناتجة عن الحمل المركز.

أطيب الأمنيات بالنجاح والتفوق

د. أحمد فاروق



Course Title: Electrical Power Engineering (1)
Date: January 30th 2010 (First term)

Course Code: EPM2105
Allowed time: 3 hrs

Year: 2nd
No. of Pages: (2)

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches...etc)

Problem number (1) (15 Marks)

- a) Define The following terms.
- Skin Effect
 - Transposition
 - ACSR
 - Flashover voltage
 - Puncture voltage
- b) The per unit length parameters of a 215 kV, 400 km, 50 Hz, three-phase transmission line are $y = j3.2 \times 10^{-6} \text{ S/km}$ and $z = (0.1 + 0.5j) \Omega/\text{km}$. The line supplies a 150 MW load at unity power factor. Determine: (a) the line voltage regulation; (b) the line efficiency.

Problem number (2) (20 Marks)

- a) Derive an expression of line capacitance for three phase transmission line with an unequal spacing taking earth effect in your considerations.
- b) The three-phase conductors of a three-phase line are arranged at the corners of a triangle of sides 2m, 2.5 m and 4.5m. If the conductor diameter is 2 cm, calculate the line inductance and capacitance per phase per km. assuming that the conductors are being transposed and neglecting earth effect.

Problem number (3) (15 Marks)

- a) Compare between aluminum and copper conductors.
- b) For the equivalent capacitance arrangement shown in Fig. (1), find the voltage distribution over a string of three-phase suspension insulators and the string efficiency if the line voltage is 33 kV.

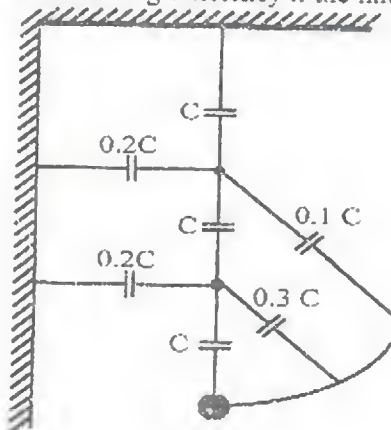


Fig. (1)

P. T. O.

Problem number (4) (15 Marks)

Put ☒ or ☐ against the number of the following sentences then correct the false sentences.

1. The skin effect of the conductor increases the effective value of conductor resistance.
2. If the length of overhead transmission line is increased its inductance increases.
3. If the power factor of load decreases, the line losses increase.
4. The sag of overhead transmission line depends on the tension on the conductor, ambient weather conditions and conductor material.
5. The ring main distribution system is not the more reliable distribution system.
6. If the length of transmitting tower is decreased, the line inductance increases.
7. By using guard ring, string efficiency is decreased.
8. The most important cause of power loss in the transmission line is the line inductance.
9. A line which connects a consumers to the distributor is called feeder.
10. Suspension type insulators are used for voltage beyond 11 kV.

Problem number (4) (25 Marks)

- a) The towers of 40m and 100m respectively support a transmission line conductor at water crossing. The horizontal distances between the towers is 500m. If the ultimate strength is 3200 kg and the safety factor is 2.0, find the minimum clearance of the conductor and water and clearance mid-way between supports. Assuming weight of conductor is 1.5 kg/m and busses of supports at water level.
- b) A DC two-wire ring distributor shown in Fig. (2) is fed from 250 V at A. the resistance of section AB, BC, CD, DE and EA is 0.075Ω . Find: (a) the voltage at each load point; (b) the string efficiency; (c) repeat parts (a) and (b) if point A and D is interconnected by an inter-connector with 0.1Ω resistor.

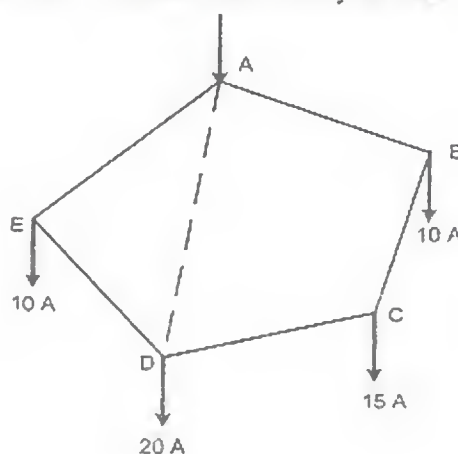


Fig. (2)

(With My Best Wishes)
Dr. Ibrahim Bedir



Course Title: Numerical analysis
Date: (First term) 2009

Year: 2nd Elec. Power
Allowed time: 3 hrs

No. of Pages: (2)

Problem number (1)

From the following table

x	0	1	2	3	4
F(x)	2	5	8	9	12

Find:

- linear spline form
- Lagrange polynomial of degree 4
- $f(0.1)$ and $f(3.5)$ using Newton's forward and backward

Problem number (2)

(a) Deduce the approximating form of $f'(x)$ by central difference.

(b) From the following table

x	0	0.5	1	1.5	2	2.5	3
F(x)	2	2.7	3.1	5.2	7.2	9	11

Find $D_{2,2}$ (Ricardson extrapolation) where $D_{n,1} = a(\frac{h}{2^{n-1}})$, $a(h)$ is central approximation of $f'(1)$ and $h=1$.

Problem number (3)

- Deduce the form of truncation error by trapezoidal rule
- Find an approximate value of $\int_0^1 \frac{1}{1+x^2} dx$ by using
 - Trapezoidal rule
 - Simpson rule
 - Gaussian three-point quadratic
- Find $R_{2,2}$ (Richardson extrapolation)

Problem number (4)

- Deduce the form of solution of Poisson equation $u_{xx} + u_{yy} = f(x, y)$ by using finite difference method.

- (b) Use finite difference method to find the solution of
 $u_t = u_{xx}$, $0 \leq x \leq 1$ and $u(x,0)=0$, $u(0,t)=1$, $u(1,t)=0$

Problem number (5)

- (a) From directional encoding for digital image of curve starting at (0,0) and represent by the sequence of codes 7701 .
(i) Represent these codes graphically in xy-plane.
(ii) From its Coordinate find quadratic spline interpolation form.
- (b) Solve the following boundary value problem
 $y'' + x y = x$, $0 \leq x \leq 1$, $y(0)=0$ and $y(1)=0$ by using linear shooting method

Dr: M.S.Nayle

With my best wishes

Page: 2/2



Tanta University

Elec. Power and Machines Engineering Department



Faculty of Engineering

Course Title : Electromagnetic Fields
Date : Jan 25th 2010 (First term)
Total Marks : 85

No. of Pages: (2)

Course Code : EPM2104
Allowed time: 3 hrs
Year : 2nd Power

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches...etc)

Question(1)

(a=6 Marks, b=15 Marks)

- Derive an expression for the electric flux density D at a point $(0,0,z)$ due to an infinite sheet of charge on the plane $z = 0$, having a uniform charge density $\rho_s \text{ C/m}^2$.
- Three concentric cylindrical surfaces have radii $\rho_1 = 2.5 \text{ m}$, $\rho_2 = 3.5 \text{ m}$, $\rho_3 = 5 \text{ m}$. The three cylindrical surfaces carry uniform surface charge densities of : $\rho_{s1} = 10 \text{ nC/m}^2$, $\rho_{s2} = -30 \text{ nC/m}^2$, $\rho_{s3} = \rho_s$ respectively.
 - Find D at $\rho = 2, 3, 4 \text{ m}$
 - Find ρ_s such that $D = 0$ at $\rho = 6 \text{ m}$

Question(2)

(a=5 Marks, b=15 Marks)

- Using Ampere's circuital law derive a mathematical expressions for the magnetic field intensity H from $\rho = 0$ to $\rho = \infty$ of an infinitely long coaxial transmission line carrying a uniformly distributed total conductor current I in the inner solid conductor and $-I$ in the outer hollow conductor, given that the inner solid conductor radius is h and the hollow outside conductor inner radius is b and its outer radius is c . Sketch H versus ρ from 0 to ∞ .
- Two parallel plates of a capacitor spaced by three different dielectric materials with relative permittivities 5, 4, 2 and thickness 2, 3, 1 mm respectively. If each plate has an area of 4 cm^2 and the total applied voltage is 500 V, calculate:
 - The total capacitance.
 - The electric field intensity in each dielectric material.
 - The voltage across each dielectric material.
 - The energy stored in each dielectric material.

Page: 1/2

P.T.O.

Question(3)*(a=6 Marks, b=15 Marks)*

- a) Defining each term used, write the Maxwell's equations in its integral form for static Fields.
- b) Using a cylindrical coordinates ($0 \ll \rho \ll a$, $0 \ll \Phi \ll \pi$, $0 \ll z \ll z$), find the electric field intensity and the stored energy in this electric field over this cylinder if:
- i) $V = \frac{\rho V_o}{2a}$
- ii) $V = V_o \cos^2 \Phi \left(\frac{\rho}{a} \right)$

Question(4)*(a=6 Marks, b=16 Marks)*

- a) Aided with clear sketches, derive expressions that determine the perfect dielectric material properties at the surface between two dielectric materials when they are placed in an external electric field using the boundary conditions.
- b) Calculate the force produced on a square loop ABCD in $z = 0$ plane carrying a current of 5 mA flowing from D to C to B to A to D (clockwise direction) due to a current carrying conductor of 10 A and placed on the plane $z = 0$, $X = 0$, and its direction is in the +ve y direction, where coordinates of the square loop are: A(2,0,0), B(4,0,0), C(4,2,0), and D(2,2,0).

*Good Luck**Prof. M.A.El-Khazendar*

Course Examination Committee

Prof. M.A. El-Khazendar

Dr. M.K. Elnemr

Course Coordinator: Prof. M.A. El-Khazendar

Prof. E.M. Rashad

Dr. M. Abd Elaziz



Final EXAM 2009/2010 - First Term

Course	Energy Conversion (EPM2106)	Time Allowed	3 hours
Students	2nd Year (Electrical Power and Machines)	Total Mark	90
Date	Sat. 23 rd January, 2010	Number of pages	4

Attempt ALL the following questions and problems:

- Clarify your answer with the suitable sketches as you can.
- Assume any missed data reasonably.

The first question (15 marks)

Choose the correct answer/answers for the following statements. It is sufficient to write down the question number followed by your choice/choices in your answer sheet:

1.	Higher magnetic permeability leads to A) higher inductance B) lower inductance C) more flux leakage D) lower iron losses
2.	Iron losses depend on A) electric supply frequency only B) flux level only C) area of hysteresis loop of the material only D) all the of the above choices
3.	Compared with magnetic materials, permanent magnetic material has higher values of A) magnetic field intensity (H) B) flux density (B) C) relative permeability (μ_r) D) current
4.	Mutual inductance between two coils increases with increase of: A) angle between their axes B) distance between them C) their currents D) none of the above choices
5.	For mutually coupled coils, if currents are both entering at the dot-marked terminals, coil fluxes A) are additive B) are subtractive C) increase D) cancel each other
6.	For ideally coupled coils, coupling coefficient is A) zero. B) unity C) infinity D) between zero and unity

7. The stored energy in magnetically coupled coils does not depend on
A) coupling coefficient between coils.
B) angle between coils
C) direction of motion
D) direction of currents
8. For dc excitation, induced emf is
A) always zero
B) only transformer voltage
C) both speed and transformer voltages
D) only speed voltage
9. A rotating system with salient stator and rotor, electromechanical energy conversion is possible if:
A) only stator winding is excited.
B) only rotor winding is excited.
C) both stator and rotor windings are excited.
D) either stator or rotor winding is excited.
10. For a rotating system with salient stator and cylindrical rotor:
A) only stator self inductance is function of rotor position
B) rotor self inductance is NOT a function of rotor position
C) both rotor self inductance and mutual inductance are functions of rotor position
D) all inductances (self and mutual) are functions of rotor position
11. A rotating system with ac excitation for stator and dc excitation for the rotor is called a
A) reluctance machine
B) synchronous machine
C) induction machine
D) dc machine
12. A two-phase winding excited from a two-phase gives
A) a single rotating mmf
B) two rotating mmfs with anti-direction
C) stationary mmf
D) pulsating mmf.
13. Renewable sources of energy has the advantage of
A) low running cost
B) low initial (capital) cost.
C) cheap equipments
D) continuous availability
14. To obtain higher voltages, solar cells are connected
A) in parallel
B) in series
C) in series-parallel combination
D) with a battery of higher voltage
15. The most effective quantity on the available mechanical energy at shaft of a wind turbine is:
A) air density B) turbine diameter C) wind speed D) turbine power coefficient

The second question (10 marks)

Which of the following statements is correct? You can write down in your answer sheet the question number followed by either ✓ or X mark.

1.	Inductance of a coil increases with increase in magnetic reluctance of its core.
2.	For a linear magnetic system, coil inductance does not depend on its current
3.	Motional (speed) voltage increases with increasing supply frequency
4.	Mutual inductance between two coils depends on their self inductances
5.	For linear magnetic system stored energy equals co-energy.
6.	Direction of electromagnetic torque is to increase inductance
7.	Transformer voltage depends on coil inductance variation with position.
8.	The mutual inductance between two magnetically coupled coils <u>must be</u> lower than the smaller self inductance of each coils
9.	For doubly excited rotating system, it is necessary to have some saliency for possible electromechanical energy conversion.
10.	Distributed winding provides more sinusoidal mmf space variation

The third question (22 marks)

1.	Discuss what is meant by magnetic flux leakage and fringing in the magnetic circuits; then show how to minimize them. (4 marks)
2.	With the aid of BH curve of a permanent magnet material show: a) the effect of air gap length on the position of the operation point b) the point of maximum energy product (4 marks)
3.	Explain the dot convention employed to determine the polarity of the mutually induced voltages. Then show how it can be determined experimentally. (4 marks)
4.	For a singly-excited rotating electromechanical energy converter, derive a relation for the developed torque in terms of both stored energy and co-energy. (5 mark)
5.	With the aids of current-flux linkage curves, derive how to determine energy converted into mechanical motion from a certain position to another. (5 marks)

The fourth question (28 marks)

1.	For a doubly-excited electromechanical energy conversion device of cylindrical stator and rotor: a) Sketch the space variation of self and mutual inductances. (2 marks) b) Derive a general expression for the electromagnetic torque acting on the rotor. (6 marks) c) Show all the possible electrical machines can be obtained. (2 marks)
2.	Show the MMF space distribution a dc-excited coil of uniform air gap, if the conductors are : a) concentrated b) distributed in 8 slots (4 in each side). Which of the two cases are preferred? Why ? (4 marks)

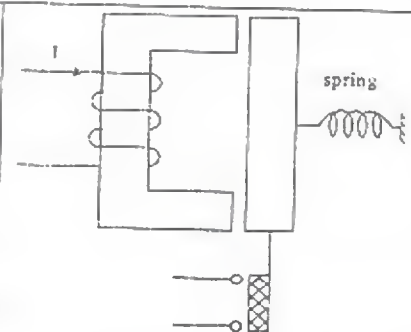
3. Both analytically and graphically, show that balanced three-phase windings excited by balanced three-phase currents, produce a single rotating MMF wave. (4 marks)
4. Give brief notes on advantages and disadvantages of renewable sources of energy. (4 marks)
5. Using suitable clarifications of sufficient data, show the following: (6 marks)
 - a) Solar cell characteristics
 - b) Wind turbine characteristics
 - c) Components of a photovoltaic generating system.
 - d) A wind-energy-based generating system.

The fifth question (15 marks)

1. The relay shown in figure has mean core length of 40 cm. The air-gap lengths are 2 mm each. The coil has 1000 turns. The core is made of a steel having B-H relation given in the following table:

H (AT/m)	400	500	700	900	1100	1400
B (T)	0.4	0.6	0.8	1.0	1.1	1.2

A flux density of 0.9 Tesla is required to actuate the relay. Find the necessary coil current. (5 marks)



2. The self and mutual inductances of two exciting coils of a multiply-excited translational system are:

$$L_{11} = L_{22} = \frac{3.6}{1+2x} \quad \text{and} \quad L_{12} = L_{21} = \frac{1.8}{1+2x}$$

The two coils are connected in series to a voltage supply of $100 \cos(314t)$. If the displacement x is held at 40 cm, find

- a) current (as a time expression) (5 marks)
- b) average force (5 marks)

Good Luck and best wishes
Prof. Essam Eddin M. Rashad

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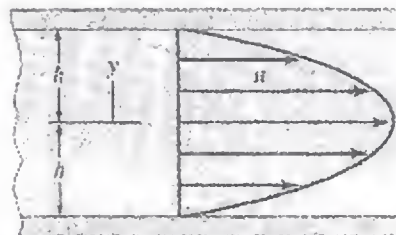
<p style="text-align: center;">TANTA UNIVERSITY FACULTY OF ENGINEERING</p> <p style="text-align: center;">DEPARTMENT OF MECHANICAL POWER ENGINEERING EXAMINATION (2 YEAR) STUDENTS OF Electrical Power Engineering</p>			
COURSE TITLE: Mechanical Engineering			COURSE CODE: MEP2141
DATE: .../.../...	TERM: FIRST....	TOTAL ASSESSMENT MARKS: 75	TIME ALLOWED: 3.. HOURS

الإمتحان مكون من 6 أسئلة في ورقتين

PROBLEM # 1 (10 mark)

The velocity distribution for the flow of a Newtonian fluid between two wide, parallel plates is given by the equation

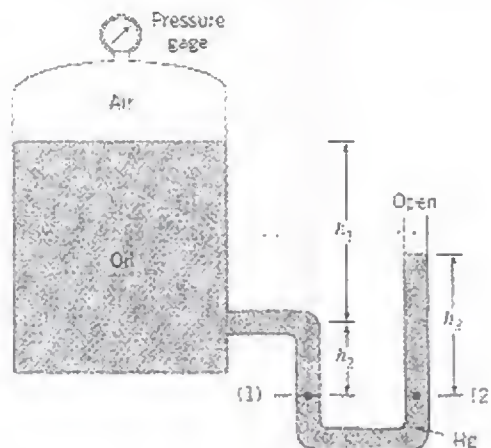
$$u = \frac{3V}{2} \left[1 - \left(\frac{y}{h} \right)^2 \right]$$



Where V is the mean velocity. The fluid has a viscosity of 0.04 pa. s . When $V = 2 \text{ m/s}$ and $h = 0.1 \text{ m}$ determine: (a) the shearing stress acting on the bottom wall, and (b) the shearing stress acting on a plane parallel to the walls and passing through the centerline (mid plane).

PROBLEM # 2 (10 mark)

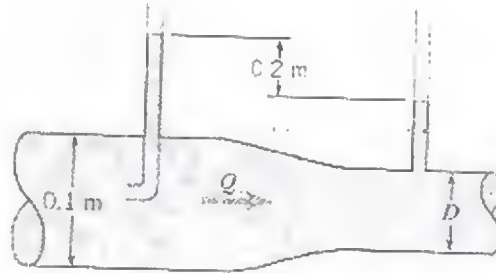
A closed tank contains compressed air and oil $SG_{oil} = 0.9$ as is shown in Figuer U-tube manometer using mercury $SG_{Hg} = 13.6$ is connected to the tank as shown. For column heights $h_1 = 36 \text{ cm}$, $h_2 = 6 \text{ cm}$ and $h_3 = 9 \text{ cm}$ determine the pressure reading of the gage.



1/c

PROBLEM # 3 (10 mark)

Water flows through the pipe contraction shown in Fig. For the given 0.2-m difference in manometer level, determine the flow rate as a function of the diameter of the small pipe, D .



PROBLEM # 4 (10 mark)

Automobile engine that operates on four-stroke produced the brake power 94 kW at speed 2000 rpm, number of cylinder 6 cylinder, cylinder diameter 80 mm and stroke length 108 mm.

Calculate:

- a- Stroke volume
- b- Engine capacity
- c- Brake mean effective pressure
- d- Torque

PROBLEM # 5 (15 mark)

A plane wall, 0.15m thick, internally generates heat at a rate of $6 \times 10^4 \text{ W/m}^3$. One side of the wall is insulated and the other side is exposed to an environment at 25°C . The heat transfer coefficient between the wall and the environment is $750 \text{ W/(m}^2\cdot\text{K)}$. The thermal conductivity of the wall is $20 \text{ W/(m}\cdot\text{K)}$. Calculate the maximum temperature in the wall.

PROBLEM # 6 (15 mark)

A centrifugal pump deliver $0.2 \text{ m}^3/\text{s}$ discharge of the water from suction reservoir to delivery reservoir. The static suction head 5 m below the atmospheric pressure and static delivery head 18 m above the atmospheric pressure. Diameter of suction and delivery pipe is 20 cm and length of suction pipe 5.5 m and length of delivery pipe is 20 m. the friction factor of pipe material 0.04 m. Determine the shaft power input to the pump. Given pump efficiency 0.86.

انتهت الاسئلة

5/6



Course Title: Civil Engineering (Second Paper) Course Code: CSE2155
Date: 24th January 2011 (First term) Allowed time: 3 hrs

- Assume any missing data
- Answers should be supported by sketches

الورقة الثانية (25 درجة)

السؤال الأول:- (9 درجات)

- عرف التربة موضحا كيف تكونت؟
- ما المقصود بفقاعة الضغط داخل التربة؟ وما هو تأثير أبعاد الأساس على شكلها؟
- وضح كيف يمكن تصنيف التربة طبقا لقطر حبيباتها؟
- ماهى أهم الفروق بين التربة المتماسكة والتربة الغير متماسكة؟ اذكر أمثلة على بعض أنواع تلك التربة.
- أذكر ما تعرفه عن أنواع التربة ذات المشاكل موضحا الاضرار التى تنشأ عند التأسيس عليها.
- مفائدة استخدام السمات لكل من الأساسات السطحية والأساسات العميقة.

(1.5 درجة)

(1.5 درجة)

(1.5 درجة)

(1.5 درجة)

(1.5 درجة)

(1.5 درجة)

السؤال الثانى:- (9 درجات)

- وضح فقط بالرسومات المتقنة مع وضع كافة البيانات على الرسم كلا مما ياتى:
- التوزيع المثلى لمكونات التربة فى الحالة الجافة والمشبعة والغير مشبعة.
 - دورة انتقال الأحمال من المنشأ الى التربة.
 - توزيع الاجهادات داخل التربة خلال مستوى رأسى يمر بمنتصف الأساس.
 - أنواع الأساسات السطحية، مع توضيح متى يتم استخدام كل نوع منها.
 - الحالات المختلفة لشكل انهيار التربة أسفل الأساس نتيجة ضعف قدرة تحملها للاجهادات.
 - الأنواع المختلفة للخوازيق المستخدمة كأساسات عميقة.

(1.5 درجة)

(1.5 درجة)

(1.5 درجة)

(1.5 درجة)

(1.5 درجة)

(1.5 درجة)

السؤال الثالث:- (7 درجات)

- أذكر أنواع الهبوط الذى يحدث للتربة أسفل المنشآت.
- وضح لماذا يعتبر الهبوط النسبى أكثر خطورة على المنشأ من الهبوط الكلى.
- ما هى قيم الهبوط الكلى والهبوط النسبى المسموح بها للأساسات طبقا للكود المصرى لتصميم الأساسات.
- إذا علمت بوجود كابل كهربائى على عمق 2 متر يمر أسفل منتصف قاعدة برج كهربائى سيتم انشاؤها بأبعاد 2.0×2.0 متر على سطح الأرض بحيث تعطى اجهدا أسفلها مباشرة مقداره 1.0 كجم/سم^2 ، وكان السطح السفلى لطبقة التربة التى يمر بها الكابل تقع على عمق 4.0 متر تحت سطح الأرض (أى أن سمك الطبقة يساوى 4.0 متر)، وكان معدل التغير الحجمى لهذه الطبقة هو $0.02 \text{ سم}^2/\text{كجم}$ ، فالمطلوب حساب مقدار الهبوط المتوقع للكابل نتيجة انضغاط تلك الطبقة.

(1 درجة)

(1 درجة)

(1 درجة)

(4 درجة)

أطيب الأمنيات بالنجاح والتفوق
د. أحمد فاروق

Course Title: Engineering Mathematics 3(a)
Date: Jan. 17th 2011 (First term)Course Code: PME2109
Allowed time: 3 hrsYear: 2nd
No. of Pages: (2)

Remarks: (answer the following problems... assume any missing data... answers should be supported by sketches)

Problem number (1) (20 Marks)

- a) The following data of the velocity of a body is given as a function of time in the following table.
- 10 Marks**

t (s)	4	7	10	15
$v(t)$ (m/s)	22	24	37	46

What is the best estimate of the distance in meters covered by the body from $t=5$ to $t=15$ using combined Simpson's rule and Trapezoidal rule.

- b) Consider the following approximation:
- 10 Marks**

$$f'(0) \approx \frac{4f_1 - f_2 - 3f_0}{2h}$$

1. Derive this approximation using Taylor's Theorem.
2. Give the accuracy of the above approximation. Your answer should be something like $O(h^n)$?
3. Use Richardson extrapolation technique to reduce the truncation error to an order $O(h^4)$.
4. Let $f(x) = x^4$: find an approximate value of $f'(0)$ with the result given by part 3, using $h=0.1$.

Problem number (2) (15 Marks)

- a) Consider the following data
- 5 Marks**

x	1.4	1.8	2.2
$f(x)$	3.12	2.81	1.70

- Construct the divided difference table for the data.
 - Obtain Newton's interpolating polynomial to estimate $f(1.6)$.
- b) Use cubic spline to approximate the value of $f(1.6)$. **5 Marks**
- c) Comment on the sentence "Polynomial interpolating continuous function at equally spaced points may not converge to function as number of data points and polynomial degree increases". (Hint: this is best illustrated by Runge's phenomena). **5 Marks**



Final EXAM 2010/2011 - First Term

Course	Energy Conversion (EPM2106)	Time Allowed	3 hours
Students	2nd Year (Electrical Power and Machines)	Total Mark	90
Date	Wed, January 12 th , 2011	Number of pages	4

Attempt ALL the following questions and problems:

- Clarify your answer with the suitable sketches of complete data as you can.
- Assume any missed data reasonably.

The first question (14 marks)

Choose the correct answer/answers for the following statements. It is sufficient to write down the question number followed by your choice/choices in your answer sheet:

- Nonlinear magnetic characteristics leads to:
 - distorted magnetizing current
 - higher inductance
 - higher power loss
 - inducing an emf
- Iron losses depend on
 - electric supply frequency only
 - flux level only
 - area of hysteresis loop of the material only
 - all the of the above choices
- Permanent magnetic material has relative permeability (μ_r) of
 - infinity
 - unity
 - zero
 - negative
- Mutual inductance between two coils *does not* depend on
 - angle between their axes
 - distance between them
 - their currents
 - material of magnetic path between them
- For mutually coupled coils, if currents are both leaving at the dot-marked terminals, coil fluxes
 - are additive
 - are subtractive
 - increase
 - cancel each other
- For perpendicular coupled coils, coupling coefficient is
 - zero.
 - unity
 - infinity
 - between zero and unity
- For dc excitation, induced emf is
 - always zero
 - only transformer voltage
 - both speed and transformer voltages
 - only speed voltage

Please Turn Over

8.	A system with cylindrical stator and rotor, electromechanical energy conversion is possible if: A) only stator winding is excited. B) only rotor winding is excited. C) both stator and rotor windings are excited. D) either stator or rotor winding is excited.
9.	For a rotating system with a cylindrical stator and salient rotor: A) mutual inductance is NOT function of rotor position B) rotor self inductance is NOT a function of rotor position C) both rotor and rotor self inductances are functions of rotor position D) all inductances (self and mutual) are functions of rotor position
10.	A rotating system with ac excitation for stator and shorted rotor circuit is called a A) reluctance machine B) synchronous machine C) induction machine D) dc machine
11.	A three-phase winding excited from a three-phase supply gives A) a single rotating mmf B) two rotating mmfs with anti-direction C) stationary mmf D) pulsating mmf.
12.	Conventional fossil sources of energy has the advantage of A) low running cost B) safe operation. C) economically feasible D) continuous availability forever
13.	To obtain higher currents for the same voltage solar cell modules are connected A) in parallel B) in series C) in series-parallel combination D) with a battery of higher capacity
14.	The most effective quantity on the available mechanical energy at shaft of a wind turbine is: A) air density B) turbine diameter C) wind speed D) turbine power coefficient

The second question (10 marks)

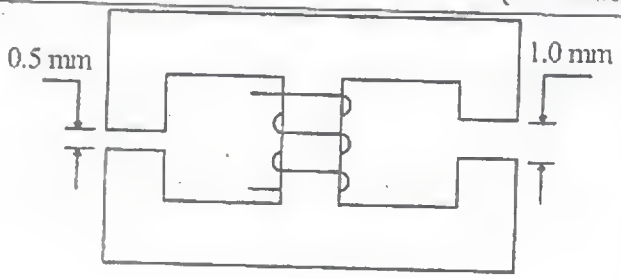
Which of the following statements is correct? You can write down in your answer sheet the question number followed by either ✓ or X mark.

1.	To reduced hysteresis losses, magnetic circuit is made of isolated laminations.
2.	For non-magnetic materials, the B-H relation is linear.
3.	Polarity of induced voltage due to self inductance depends on currents in coupled coils.
4.	Direction of developed electromechanical torque tends to increase reluctance.
5.	Mutual inductance between two coils depends on their self inductances
6.	Coupling coefficient between coils increases with increase in leakage flux
7.	Transformer voltage depends on supply frequency
8.	For nonlinear magnetic system stored energy equals co-energy.

Please Turn Over

9.	For doubly excited rotating system, it is NOT necessary to have saliency for possible electromechanical energy conversion.
10.	Concentrated winding provides more sinusoidal mmf space variation

The third question (24 marks)

1.	Give detailed notes on the properties of magnetic materials. (4 marks)
2.	For a magnetic circuit that contains a part of a permanent magnet material and an air-gap, derive the necessary condition to minimize the volume of the magnetic material for a desired value of the flux density in the air-gap. (4 marks)
3.	Derive an expression for mutual inductances between two magnetically-coupled coils in terms of their self inductances. (4 marks)
4.	For two magnetically-coupled coils, show that the total stored energy W_f is given by: $W_f = \frac{1}{2} L_{11} I_1^2 + \frac{1}{2} L_{22} I_2^2 \pm M I_1 I_2$ <p>where I_1 and I_2 are the currents in the two coils. L_{11} and L_{22} are the self-inductances of the two coils. M is the mutual inductance between the two coils. (4 mark)</p>
5.	If the relationship between total flux linkage " λ " and current " i " of a magnetic circuit is given as $\lambda = \frac{6i}{2i+1}$ <p>Determine the energy stored in the magnetic field when λ is varied from zero to 2 Wb.t (4 marks)</p>
6.	<p>The coil, wound on the center limb of the magnetic circuit shown in figure has 250 turns and a resistance of 3Ω. The uniform cross-section of the magnetic circuit is 10 cm^2. The relative permeability of the iron part of the circuit is infinitely high. It is required to produce a flux of 25 mWb in the left air-gap. Determine</p> <p>a) the value of the dc voltage that to be applied to the coil terminals. (2 marks)</p> <p>b) the value of the flux in the right air-gap. (2 marks)</p> 

The fourth question (20 marks)

1.	With the aid of suitable mathematical relations, define what is meant by transformer and rotational voltages. (4 marks)
2.	Sketch the space variation of self and mutual inductances of a rotating system of salient stator and cylindrical rotor. (3 marks)
3.	For a translational electro-mechanical energy conversion system, derive expressions for current, flux linkage and force in terms of <u>stored energy</u> and <u>coenergy</u> . (4 marks)

Please Turn Over

4.	With the aids of current-flux linkage curves, derive how to determine energy converted into mechanical motion from a certain position to another. (4 marks)
5.	A doubly-excited rotating system with saliency associated with both the stator and the rotor. The stator self inductance has maximum and minimum values of 0.4 H and 0.2 H respectively, while maximum and minimum values of the rotor self inductance are 0.6 H and 0.4 H respectively. The maximum value of the mutual inductance between the two coils is 0.2 H. Find an expression for the torque acting on the rotor as a function of the angular position when stator current is 1 A and rotor current is 0.5 A. Sketch the variation of torque against rotor angular position. (5 marks)

The fifth question (22 marks)

1.	Derive a general expression for the electromagnetic torque acting on the rotor of an AC doubly-excited device. The device has a cylindrical stator and a salient-pole rotor. Then show how can this device be used as: 1- a synchronous machine. (4 marks) 2- a reluctance machine. (2 marks)
2.	Show that the single-phase winding excited from an AC supply produces a pulsating MMF wave. Then show that this mmf can be viewed as the resultant of two rotating mmfs in opposite directions. (6 marks)
3.	Give detailed notes on sources of electrical energy (4 marks)
4.	Only using suitable diagrams of sufficient data, show the following: a) A photovoltaic generating system. (2 marks) b) A wind-energy-based electric generating system. (2 marks)

Good Luck and best wishes
Prof. Essam Eddin M. Rashad



Course Title : Electromagnetic Fields	Course Code : EPM2104
Date : Jan 15 th 2011 (First term)	Allowed time : 3 hrs
Total Marks : 85	Year : 2 nd Power
No. of Pages: (2)	

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches...etc)

ANSWER ALL QUESTIONS

Question(1)

(a = 5 Marks, b = 12 Marks)

- Using Gauss's law, derive an expression for the electric field intensity E at a point $P(r, \theta, \Phi)$ due to a point charge Q located at the origin.
- Three concentric cylindrical surfaces have radii : $\rho_1 = 2$ m, $\rho_2 = 4$ m and $\rho_3 = 6$ m carry uniform charge densities of : $\rho_{s1} = 20$ nC/m², $\rho_{s2} = -4$ nC/m², and ρ_{s3} nC/m² respectively.
 - Calculate D at $r = 1, 3$, and 5 m
 - Compute ρ_{s3} such that $D = 0$ at $\rho = 7$ m

Question(2)

(a = 5 Marks, b = 12 Marks)

- Aided with clear sketches and defining each term used, derive the potential difference due to an infinite line charge between two points A and B.
- Two spherical concentric conductors with the inner spherical conductor is solid and has a radius a and its voltage is V_1 . The outer spherical conductor has inner radius b and outer radius c and it has a voltage V_2 . Find the charges Q_1 and Q_2 for the following conditions:
 - The two conductors are isolated.
 - The inner conductor is grounded.
 - The outer conductor is grounded.
 - The inner conductor is not charged.

Question(3)

(a = 6 Marks, b = 11 Marks)

- Using Ampere's circuital law derive a mathematical expressions for the magnetic field intensity H from $\rho = 0$ to $\rho = \infty$ of an infinitely long coaxial transmission line carrying a uniformly distributed total conductor current I in the inner solid conductor and $-I$ in the outer hollow conductor, given that the inner solid conductor radius is h and the hollow outside conductor inner radius is b and its outer radius is c .
Sketch H versus ρ from 0 to ∞ .

- b) Two parallel plates spaced by three different dielectric materials with relative permittivities 5, 8, 12 and thicknesses 2, 5, 3 mm respectively. If each plate has an area of 3 cm and the total applied voltage is 1000 V, calculate:
- The total capacitance.
 - The electric field intensity in each dielectric material
 - The voltage across each dielectric material.
 - The energy stored in each dielectric material.

Question(4)

(a = 5 Marks, b = 12 Marks)

- Aided with clear sketches, derive an expression for the magnetic field intensity at point P due to a current carrying conductor of finite length.
- The $z = 0$ plane is a perfectly conducting surface. A point charge of 5 nC is located at A(4,3,1), and a point charge of -8 nC is at B(2,-5,4), all in free space. Calculate V at a point midway between the two point charges.

Question(5)

(a = 5 Marks, b = 12 Marks)

- Aided with clear sketch, apply the boundary conditions on the surface separating two perfect dielectric materials of permittivity ϵ_1 and ϵ_2 to determine the relations between D_1 and D_2 and between E_1 and E_2 in terms of θ_1 , ϵ_1 , θ_2 and ϵ_2 .
- Calculate the force produced on a square loop ABCD, in the $z = 0$ plane, carrying a current of 2 mA flowing in the anticlockwise direction due to a current carrying conductor of 15 A and placed on the plane $z = 0$, $X = 0$, and its direction is in the -ve y axis, where coordinates of the square loop are: A(1,0,0), B(3,0,0), C(3,2,0), and D(1,2,0).

Permittivity of free space $\epsilon_0 = 8.85 \times 10^{-12}$ F/m , Permeability of free space $\mu_0 = 4\pi \times 10^{-7}$ H/m

Good Luck

Prof. M.A.El-Khazendar

Course Examination Committee

Prof. M.A. El-Khazendar

Prof. E.M. Rashad

Dr. S. Alam

Dr. R. El-Sehiemy

Course Coordinator: Prof. M.A. El-Khazendar

Problem number (3) (15 Marks)

- a) Derive the following multi-step method:

10 Marks

$$y_{i+1} = a_1 y_i + h[b_1 f(x_i, y_i) + b_2 f(x_{i-1}, y_{i-1})]$$

- Choose the constants a_1, b_1 and b_2 so that this method has the highest order of local truncation error.
- Apply this technique to solve the IVP $y' = x - y + 1, y(0) = 1$ at $y(0.2)$

- b) Consider the following system

5 Marks

$$y_1^{(1)}(x) = y_2 - y_3^2, \quad y_2^{(1)}(x) = x + y_1 + y_3, \quad y_3^{(1)}(x) = y_2 - y_1^2$$

$$y_1(0) = 1, y_2(0) = 0, y_3(0) = 1.$$

Approximate $Y(0.1)$ by taking a single step of size 0.1 using RK2 method.

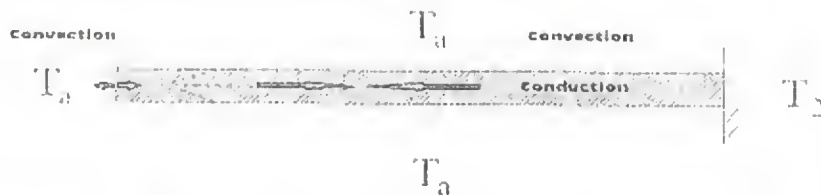
(Note that: $Y(x) = [y_1(x), y_2(x), y_3(x)]^T$).

Problem number (4) (35 Marks)

- a) The conservation of heat can be used to develop a heat balance for a long, thin rod by the following BVP: 15 Marks

$$T'' + k(T_a - T) = 0, \quad \frac{dT}{dx}(0) = T_1 \quad \text{and} \quad T(L) = T_2$$

For a 10 m rod with $T_a = 200, T_1 = 0, T_2 = 400$ and $k = 0.05$.



In details, use finite difference method to solve this problem numerically by dividing the rod into five equal parts.

- b) The displacement of a stretched square membrane subjected to a uniform 10 Marks

load is governed by $\nabla^2 u = -10x, 0 \leq x \leq 3, 0 \leq y \leq 3$ and $u(x, y) = 20x + 30y$, on the boundaries. Take $h = k = 1$, find the approximate displacement using finite-differences.

- c) Find an approximate solution to the wave equation

10 Marks

$$\frac{\partial^2 u}{\partial t^2} = 4 \frac{\partial^2 u}{\partial x^2}, \quad x \in (0, 1), \quad 0 \leq t \leq 1, \quad \text{that satisfies the conditions:}$$

$u(0, t) = 0, u(1, t) = 0, 0 \leq t \leq 1$, and the initial conditions $u(x, 0) = \sin \pi x, u_t(x, 0) = 0, 0 \leq x \leq 1$. Take $h = 0.1$ and $k = 0.05$, for only two levels.

With my best wishes

Dr. Waheed Kamal Zahra

Course Title: Electrical Power Engineering (1)
Date: February 22nd 2011

Course Code: EPM2105
Allowed time: 3 hrs

Year: 2nd
No. of Pages: (2)

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches...etc)

Problem number (1) (10 Marks)

A three-phase double circuit line has the conductors at the corners of a hexagon as shown in Figure (1).
(i) Find the capacitance and inductance per phase per km in terms of side D and conductor radius r ;
(ii) If $D = 3.5\text{m}$ and $r = 1.09\text{ cm}$ find the capacitance per phase per km and capacitance per conductor per km; (iii) If the line voltage is 132 kV and line length is 100 km. find the charging current and charging megavolt ampere.

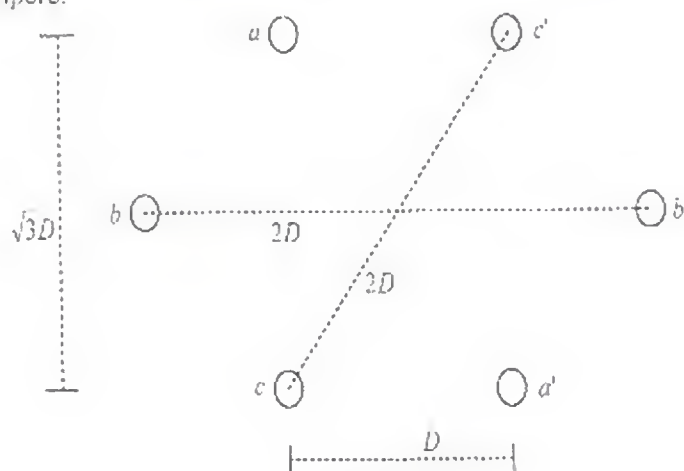


Figure (1)

Problem number (2) (20 Marks)

- a) Define the following terms, illustrate your answer with suitable sketch:
- Skin Effect.
 - Transposition of overhead transmission line.
 - Ferranti Effect.
 - Puncture and flashover voltage of an insulator.
- b) The per unit length parameters of a 220 kV, 200 km, 50 Hz, three-phase transmission line are $y = 7.5 \times 10^{-6} \text{ S/km}$ and $z = (0.1 + j0.5) \Omega/\text{km}$. The line supplies a 100 MW load at 0.8 lagging power factor. **Determine:** (i) the line constants ABCD, using π model; (ii) the line voltage regulation; (iii) the line efficiency; (iv) the load impedance at maximum power received to load and then calculate maximum power.

Problem number (3) (20 Marks)

- a) Discuss why:
- Porcelain is the most commonly used material for insulators.
 - Pin insulators are used for low voltages while suspension insulators are used for high voltages.
 - The voltage distribution across the units of a string insulator is not uniform.
- b) For the a string insulator shown in Figure (2), find value of c_1 , c_2 and c_3 for uniform distribution over the string.

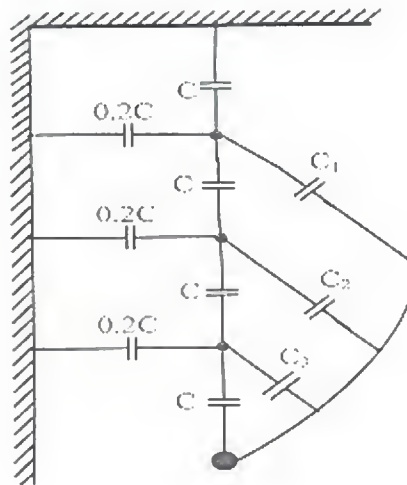


Figure (2)

Problem number (4) (20 Marks)

- a) Derive a formula for mechanical tension at general point $p(x,y)$ as a function of mechanical tension at lowest point of conductor supported at two towers with equal height, and then determine the mechanical tension at the two supports. Finally evaluate the actual conductor length between the two supports.
- b) A transmission line over a hillside where the gradient is 1:20 is supported by two 22 m height towers with a distance of 300 m between them. The lowest conductor is supported at 2 m below the top of each tower. Find the clearance of the conductor from the ground if the conductor weight is 1.0 kg/m, the maximum tension is 3000 kg and safety factor is 2.0.

Problem number (5) (20 Marks)

A DC two-wire ring distributor with interconnector between B and D is shown in Figure (3). It is fed from 250 V at A and the resistance of sections AB, BC, CD, DE, EA and BD is 0.1Ω . Find: (i) the current through distribution sections; (ii) the voltage at each load point; (iii) the Distributor efficiency.

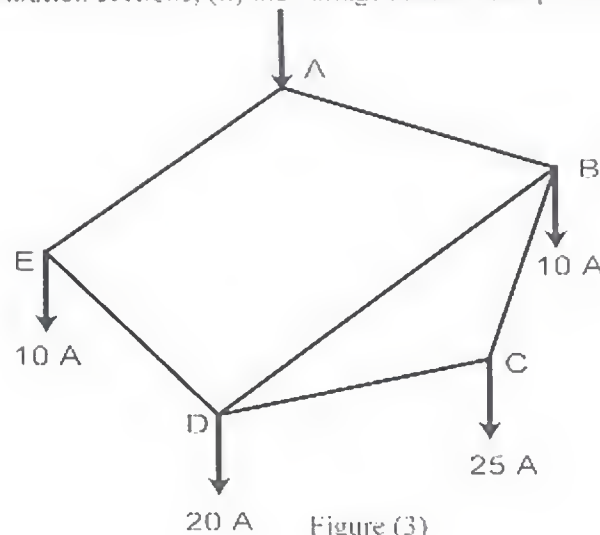


Figure (3)

(With My Best Wishes)
Dr. Ibrahim B. M. Taha

Course Title: Civil Engineering
Date: January 24, 2011 (First term)Course Code:
Allowed time: 3 hrsYear: 2nd
No. of Pages: (2)Remarks: (answer all the following questions, and assume any missing data)
(answers should be supported by sketches)السؤال الأول (٢٠ درجة)

- أ- ما هي العوامل التي يتوقف عليها اختيار مقياس الرسم المناسب لخريطة ؟ (٥ درجات)
- ب- وضح بالرسم فقط كل من الآتي : زاوية الانحراف الرأسى - الاحداثيات الجيوديسية لنقطة - الاجزاء الرئيسية في تلسكوب ميزان القامة - العلاقة بين الزاوية الرأسية والزاوية السمتية. (٥ درجات)
- ج- المطلوب تصميم ورسم مقياس رسم تخطيطي ١ : ٥٠٠ يقرأ مباشرة إلى اقرب ٠,٦ ذراع معماري ثم بين عليه حدا طول له ٧٤,٤ ذراع معماري. (١٠ درجات)

السؤال الثاني (١٥ درجة)

- أ- أشرح كيف يمكنك إيجاد فرق المنسوب بين نقطتين في موقع عمل تعذر توافر ميزان قامة فيه ووضح أجابتك بالرسم. (٥ درجات)
- ب- أخذت القراءات الآتية بالأمتار في ميزانية أحريت في موقع كوبري علوي وكانت كما يلي:
- ٢,٣٣ - ٢,٢٢ - ١,٦٨ - ٢,١٦ - ٢,٥٤ - ٢,٥٧ - ١,٩٦ - ٣,١٤ - ٢,٢٣ - ٢,٧٨ - ٢,٦٥ - ٣,٤٨ - ٢,٥٩ - س - ١,٧٩. فإذا علمت أن منسوب النقطة الخامسة = ٨,١٢ متر وأن الميزان نقل بعد القراءات الرابعة والسابعة والثانية عشر، وأن النقطة السادسة مأخوذة على كمرة الكوبري العلوي والقامة مقلوبة فالمطلوب: إيجاد مناسب النقاط المختلفة في جدول ميزانية كامل وعمل جميع التحقيقات الحسابية ثم أوجد مقدار القراءة (س) إذا علمت أن هذه القراءة فوق نقطة مسو بها = ٧,١٨ م (١٠ درجات)

السؤال الثالث (١٠ درجة)

- يراد مد خط كهرباء ضغط عالي بين خمسة أبراج معدنية فإذا قيست المسافة الأفقية بين كل برجين متتاليين من خريطة بمقياس رسم ١ : ٥٠٠ فكانت مساوية ١٨,٦ سم وكانت الأبراج بنفس الارتفاع و سطح الأرض بميل بتعدل ١ : ٦ فإذا علمت أن الترخيم في منتصف المسافة بين كل برجين = ٧,٢ متر أوجد طول الكابل الحقيقي الذي يجب صرفه من المخازن. (ملحوظة: يهمل الحد الثاني من معادلة الترخيم)

مع تمنياتي بالتوفيق

د. حافظ عباس غفريقي

8.	For a rotating system with uniform air gap, electromechanical energy conversion is possible if: A) only stator winding is excited. B) only rotor winding is excited. C) both stator and rotor windings are excited. D) either stator or rotor winding is excited.
9.	For a rotating system with a cylindrical stator and salient rotor: A) only stator self inductance is a function of rotor position B) rotor self inductance is a function of rotor position C) both stator self inductance and mutual inductance are functions of rotor position D) all inductances (self and mutual) are functions of rotor position
10.	A rotating system with ac excitation for stator and dc excitation for the rotor is called a A) reluctance machine B) synchronous machine C) induction machine D) dc machine

The second question (10 marks)

Which of the following statements is correct? You can write down in your answer sheet the question number followed by either ✓ or X mark.

1.	To reduce leakage flux in a magnetic circuit, air gaps are to be increased
2.	For non-magnetic materials, the B-H relation is linear.
3.	Motional (speed) voltage increases with increasing supply frequency
4.	Mutual inductance between two coils depends on their self inductances
5.	For linear magnetic system stored energy equals co-energy.
6.	Direction of electromagnetic torque is to increase inductance
7.	Transformer voltage depends on coil inductance variation with position.
8.	The mutual inductance between two magnetically coupled coils <u>may be</u> lower than the smaller self inductance of each coils
9.	For doubly excited rotating system, it is necessary to have some saliency for possible electromechanical energy conversion.
10.	Distributed winding provides more sinusoidal mmf space variation

The third question (20 marks)

1.	Discuss what is meant by magnetic flux fringing in the magnetic circuits; then show how to minimize it. (4 marks)
2.	With the aid of BH curve of a permanent magnet material show the effect of air gap length on the position of the operation point (5 marks)

Please Turn Over

3. For two magnetically-coupled coils, show that the total stored energy W_f is given by:

$$W_f = \frac{1}{2} L_{11} I_1^2 + \frac{1}{2} L_{22} I_2^2 \pm M I_1 I_2$$

where I_1 and I_2 are the currents in the two coils.

L_{11} and L_{22} are the self-inductances of the two coils.

M is the mutual inductance between the two coils.

(5 mark)

4. A magnetic circuit has three parts in series. The first part has a length of 10 cm and 2 cm² cross section area and made of a magnetic material of infinite permeability. The second part is an air gap of 2.5 cm² cross section area and 4 mm length. The third part is made of a permanent magnet material having the following BII curve data:

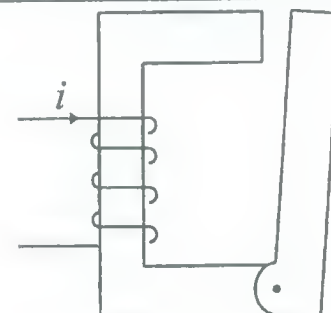
H (kAT/m)	-55	-50	-45	-40	-30	0
B (T)	0	0.35	0.8	1.0	1.1	1.25

It is required to establish a flux density of 0.8 T in the air gap. Determine the dimensions of the permanent magnet of minimum volume.

(6 marks)

The fourth question (25 marks)

- For a singly-excited rotating electromechanical energy converter, derive a relation for the developed torque in terms of both stored energy and co-energy. (5 mark)
- With the aids of current-flux linkage curves, derive how to determine energy converted into mechanical motion from a certain position to another. (5 marks)
- Sketch the space variation of self and mutual inductances for a doubly-excited electromechanical energy conversion device having saliency in both stator and rotor. (5 marks)
- The electromagnet relay shown in figure has 1000 turns. The reluctance of the iron parts can be neglected.
 - If the air-gap length is 1 mm, what is the current required to develop a force of 30 Newton? (3 marks)
 - If the air-gap length is 2 mm, what is the current required to develop the same force of 30 Newton? (3 marks)
 - What is the energy stored in the air-gap volume for the conditions in part a and part b? (4 marks)



The fifth question (20 marks)

- For a doubly-excited electromechanical energy conversion device of cylindrical stator and rotor:
 - Derive a general expression for the electromagnetic torque acting on the rotor. (8 marks)
 - Show all the possible electrical machines can be obtained. (4 marks)
- Show the MMF space distribution a dc-excited coil of uniform air gap, if the conductors are
 - concentrated
 - distributed in 8 slots (4 in each side).
 Which of the two cases are preferred? Why? (8 marks)

Good Luck and best wishes

Prof. Essam Eddin M. Rashad and Exam Committee



Final EXAM 2011/2012 - First Term

Course	Energy Conversion (EPM2106)	Time Allowed	3 hours
Students	2nd Year (Electrical Power and Machines)	Total Mark	90
Date	Sat. 16 th January, 2012	Number of pages	3

Attempt ALL the following questions and problems:

- Clarify your answer with the suitable sketches as you can.
- Assume any missed data reasonably.

The first question (15 marks)

Choose the correct answer/answers for the following statements. It is sufficient to write down the question number followed by your choice/choices in your answer sheet:

1.	Self inductance of a coil depends on A) Number of coil turns C) Coil current B) Core material D) All the above
2.	Iron losses depend on A) electric supply frequency only C) area of hysteresis loop of the material only B) flux level only D) all the above choices
3.	Compared with magnetic materials, permanent magnetic material has higher values of A) magnetic field intensity (H) C) relative permeability (μ_r) B) flux density (B) D) current
4.	For dc excitation, induced emf is A) always zero C) both speed and transformer voltages B) only transformer voltage D) only speed voltage
5.	Mutual inductance between two coils increases with increase of: A) angle between their axes C) their currents B) distance between them D) none of the above choices
6.	For mutually coupled coils, if currents are both entering at the dot-marked terminals, coil fluxes A) are additive C) increase B) are subtractive D) cancel each other
7.	For ideally coupled coils, coupling coefficient is A) zero. B) unity C) infinity D) between zero and unity

Please Turn Over

Problem number (4) (16 Marks)

(a) The conservation of heat can be used to develop a heat balance for a long thin rod. If the rod is not insulated along its length and the system is at steady state. The equation that results is :

$$T'' + \eta(T_a - T) = 0 \quad , \quad T(0) = T_1 \quad \text{and} \quad T(L) = T_2$$

For $L = 10$ m rod with $T_a = 20$, $T'(0) = 40$, $T(10) = 100$, $\eta = 0.01$ use finite difference method to solve this problem numerically by dividing the rod into five equal parts.

(b) Use the linear shooting method to get the solution of the BVP (by applying Euler's method).

$$y'' = y - x y' + 2x + 2/x \quad y(1) = 0 \quad , \quad y(2) = 4 \ln 2 \quad , \quad h = 1/2$$

Problem number (5) (16 Marks)

(a) Approximate the solution of the one-dimensional parabolic PDE

$$U_{xx}(x,t) = U_t(x,t) \quad 0 \leq x \leq 1 \quad \text{and} \quad 0 \leq t \leq 0.15, \text{ where}$$

$$U(0,t) = U(1,t) = 10 \quad \text{and} \quad 0 \leq t \leq 0.15$$

$$U(x,0) = 10 + 10x(x-1) \quad 0 \leq x \leq 1 \quad , \quad \text{use } h = 0.25 \quad , \quad k = 0.05$$

(b) Determine the vertical displacement $U(x,t)$ of a uniform perfectly flexible string of a constant density that is lightly stretched between two fixed points 0, L. Consider the wave equation given by

$$U_{xx}(x,t) = U_{tt}(x,t) \quad , \quad 0 \leq x \leq 2 \quad , \quad 0 \leq t \leq 1$$

subject to $U(0,t) = U(2,t) = 0, \quad U_t(x,0) = 0$

$$U(x,0) = 16x^2(2-x)^2 \quad 0 \leq x \leq 2 \quad \text{with } h = 0.5 \quad , \quad k = 0.25$$

Good luck

Dr. Manal Mohamed Hekal

Dr. Waheed Kamal Zahra



Course Title: Engineering Mathematics (3) a Year: 2nd Electrical Power and Machines Engineering.
Course Code: PME2109 Date: 20 / 1 / 2012 (First term) Allowed time: 3 hrs No. of Pages: (2)

Remarks: (Answer the following questions. Assume any missing data...)

Problem number (1) (19 Marks)

(a) Consider $f(x) = 2x^2 e^x + 1$, $x = 1, 1.5, 2.5$. Determine the coefficients of Lagrange interpolation to evaluate approximate value of $f(2)$.

(b) Determine the polynomial of degree ≤ 4 using Newton's divided differences that interpolate the data in the following table:

x	1.0	2.0	3.0	5.0	7.0
f(x)	14.5	19.5	29	87.5	161

(c) In a biology study, the growth of a bacteria culture recorded the following data:

t	2.0	5.0	8.0
b(t)	5.0	9.0	18.0

Where $b(t)$ denotes the number of bacteria at time t (hours). Use natural cubic spline to estimate the number of bacteria at $t = 4$ and $t = 6$.

Problem number (2) (18 Marks)

(a) Let $f(x) = x \cos x - 3x^2$. Approximate $f'(1.2)$, $f''(1.2)$ using $h = 0.1$ with errors of the order h^4 and h^2 respectively.

(b) By applying Richardson extrapolation technique, we can reduce the truncation error to approximate the first derivative of a function. Derive Richardson formula and the bound of error that is of order h^4 .

(c) Determine the number of subintervals n required to approximate the integral

$$\int_0^2 (\cos x + x^4) dx, \text{ with an error } E_T \text{ less than } 10^{-4} \text{ using the Simpson's composite rule.}$$

Problem number (3) (16 Marks)

(a) Euler's method is the simplest method of all the numerical techniques for solving IVPs. Derive formulas for local and global truncation errors of this method.

(b) Use the Adams third-order predictor-corrector method to obtain an approximation to the solution of the IVP: $y' = yx^{-2}$, $x \in [1, 2]$, $y(1) = 2$ with $h = 0.25$. Obtain the starting values using second-order Runge-Kutta method.

Q3:

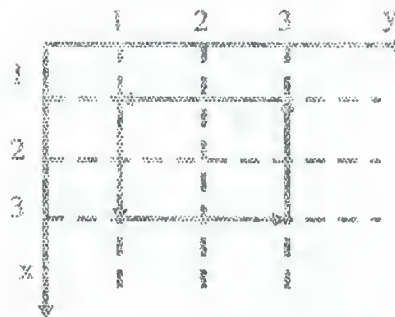
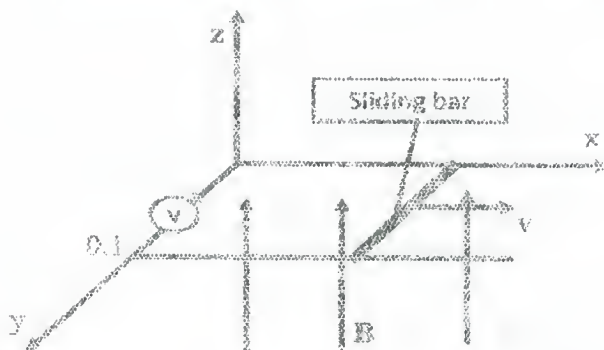
(20 Marks)

- A. Find and plot the electric field intensity and potential everywhere due to a point charge Q which located at the center of a spherical conducting shell of radii a and b . (5 Marks)
- B. The plane $z = 0$ is a perfectly conducting surface. A point charge of 5 nC is located at $A(2, -3, 6)$, and a point charge of -8 nC is located at $B(4, 3, 1)$.
- Determine V at a point midway between the two charges.
 - Find y if $V=0$ at $C(5, y, 1)$. (6 Marks)
- C. Evaluate the force produced on a square loop connecting points $A(1,0,0)$, $B(3,0,0)$, $C(3,2,0)$ and $D(1, 2, 0)$ which carries a current of 2 mA in counterclockwise direction due to a current carrying conductor of 15 A in the y -axis. (7 Marks)

Q4:

(25 Marks)

- A. Drive an expression for the magnetic field strength due to an infinite line carries current I directed in positive z -axis direction. (7 Marks)
- B. Evaluate the magnetic field strength at the point $P(2, 2, 0)$ at the center of square loop of 2 meter length located at $z = 0$ plane and carries current 5 A in counterclockwise direction as shown in the figure. (8 Marks)
- C. Let a magnetic flux density $B = (0.5x) \mathbf{a}_x$ Tesla as in the figure. The position of the sliding bar is given by $x = 4t - 2t^2$ meter. If the separation of the rails is 10 cm .
- Calculate the voltmeter reading at $t = 0.5$ second
 - Calculate the voltmeter reading when $x = 1$ meter
 - Plot the voltmeter reading for $0 < t < 3$ second (10 Marks)



WISH YOU ALL THE BEST

Dr. Ayman Hoballah

الله اعلم

End of Exam: Page 2/2



TANTA UNIVERSITY
Faculty of **ENGINEERING**
DEPARTMENT OF ELECTRICAL POWER AND MACHINES ENGINEERING
EXAMINATION (SECOND YEAR) STUDENTS OF ELECTRICAL ENGINEERING



COURSE TITLE: ELECTROMAGNETIC FIELDS			COURSE CODE: EPM2104/EPM2142
DATE: 05/01/2012	TERM: FIRST	TOTAL ASSESSMENT MARKS: 85	TIME ALLOWED: 3 HOURS

Notes:

Systematic arrangement of calculations and clear neat drawings are essential.

Any data not given is to be assumed – Answer as many questions as you can.

Answer as brief as possible

الإمتحان مكون من 4 أسئلة في ورقتين

Q1: (20 Marks)

- A. Using Gauss's law, derive an expression for the electric field intensity E at a point P a radial distance a meter from a uniformly charged infinite line by ρ_l C/m. (5 Marks)
- B. Let a point charge $Q_1 = 25$ nC be located at point $P_1 (4, -2, 7)$ and a charge $Q_2 = 60$ nC at $P_2 (-3, 4, -2)$ in free space.
- Find E at $P_3 (1, 2, 3)$.
 - Specify at what point on the y -axis is $E_x = 0$.
 - Determine the location of a point charge $Q_3 = -30$ nC to cancel the field at the origin.
 - How much electric flux leaves the surface of a sphere of radius 10 m centered at the origin? (10 Marks)
- C. A volume charge is distributed throughout a sphere of radius a meter and centered at the origin with uniform density ρ C/m³. Evaluate the electric field and total energy stored due to this charge distribution. (5 Marks)

Q2: (20 Marks)

- A. Find the work done in moving a 5 μ C charge from the $P_1(1, 3, 5)$ to $P_2(2, 18, 6)$ through electric field $E = (-8xy)\bar{a}_x - (4x^2)\bar{a}_y + \bar{a}_z$ V/m along the path: $y = 3x^2 + z$, $z = x + 4$ (5 Marks)
- B. Consider a circular line charge (ring) is placed in $z=0$ plane and centered at the origin in which the line charge density is k C/m. Calculate the electric potential at a point at z -axis away distance h from the center. (5 Marks)
- C. A potential field in the free space is defined by $V = x^2 y + 5y^2 z$ Volt. Find: -
- The volume charge density establishes this field.
 - The electric field intensity and the potential at point $P (1, 3, 2)$.
 - The potential difference between A $(1, 2, 3)$ and B $(2, 3, 1)$.
 - The total charge inside cube defined by $0 < x, y, z < 3$. (10 Marks)

Question (4) (18 Marks)

- a) Derive an expression for the sag in transmission lines between supports at the same level.
(6 Marks)
- b) An overhead line with copper conductors is supported on two towers 200 m apart having a difference in level of 10 m. The conductor diameter is 2 cm and weighs 2.3 kg/m. Calculate the sag at the lower support under the conditions if wind provides a pressure of $57.5/\text{m}^2$ of the projected area and a factor of safety is 4. The maximum tensile strength of copper is 1220 kg/cm^2 .
(12 Marks)

Question (5) (18 Marks)

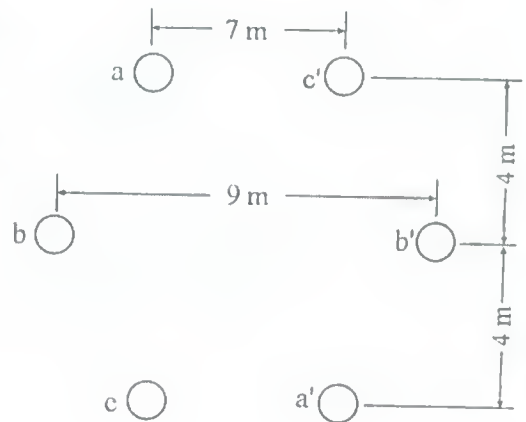
- a) Compare between the weight of copper used in 3-wire and 2-wire DC distribution system.
(6 Marks)
- b) A distributor AB of 600 m is fed from both the ends at 250 V and is loaded with loads of 100 A, 50 A and 80 A at distances of 200, 300 and 500 m respectively from the feeding end A. If the maximum allowed voltage drop is 5 V, find the resistance in ohm/m of the conductor.
(12 Marks)

With my Best Wishes

Dr. Doaa Mokhtar
and Examination Committee

Course Title: Electrical Power Engineering (1)
Date: Jan 23rd 2012 (First term)Course Code: EPM2105
Allowed time: 3 hrsYear: Second year
No. of Pages: (2)Answer all the following questions:**Question (1) (12 Marks)**

The six conductors of a double circuit transmission line are arranged as shown in the figure. The diameter of each conductor is 2.5 cm. Find the capacitive reactance to neutral and the charging current per Km per phase at 132 kV and 50 Hz, assuming that the line is regularly transposed.

**Question (2) (24 Marks)**

- Explain using phasor diagram the Ferranti effect. (4 Marks)
- Derive an expression for A, B, C, D constants for two networks in series having constants A_1, B_1, C_1, D_1 and A_2, B_2, C_2, D_2 . (4 Marks)
- A 3-phase transmission line of length 150 km delivers a load of 50 MW at 110 kV and 0.8 lagging power factor. The line has a resistance, inductive reactance and capacitive shunt admittance of $0.1 \Omega/\text{phase/km}$, $0.5 \Omega/\text{phase/km}$ and $3 \times 10^{-6} \text{ mho/phase/km}$, respectively. Using nominal-T method, determine: (16 Marks)
 - The efficiency.
 - The regulation of the line.
 - The charging current.

Question (3) (18 Marks)

- Mention the different types of insulators used in transmission lines. (4 Marks)
- What is the reason of unequal voltage distribution over suspension insulators? Mention three methods to improve this voltage distribution. (5 Marks)
- The self capacitance of each unit in a string of three suspension insulators is C . The shunting capacitance of each insulator to earth is $0.15 C$ while the capacitance between the pin and the guard ring is $0.1 C$. Calculate:
 - The voltage across each insulator as a percentage of the line voltage to earth.
 - String efficiency.

(9 Marks)

وكان الميزان قد نقل بعد القراءات الرابعة والسادسة والعاشر والرابعة عشر. عين في جدول ميزانية مناسب النقط مع عمل كل التحقيقات اللازمة إذا كان منسوب النقطة الخامسة هو متران تحت سطح البحر. وإذا أريد تسوية هذا القطاع بحيث يميل ٠,٥% إلى أسفل مع ثبات منسوب النقطة الرابعة في الميزانية فعين في نفس الجدول ارتفاع الحفر والردم إذا كانت نقط القطاع تتباعد ٤٠ متر بعضها البعض. (١٢ درجة)

السؤال الرابع - (٦ درجات)

وضح بالرسومات المتقنة وكافة البيانات على الرسم كلا مما يأتي:

- أ- كيفية انتقال الأحمال من المنشآت الى التربة.
- ب- التوزيع المثلى لكل من : التربة الجافة - التربة المشبعة جزئيا- التربة المشبعة كليا.
- ت- شكل توزيع الاجهادات الرأسية داخل التربة الناتجة عن كلا من وزن التربة والأحمال الخارجية وذلك خلال مستوى رأسى يمر بمنتصف الأساس.
- ث- بعض الأسباب التى تؤدى لحدوث ظاهرة الهبوط النسبى فى المنشآت.

السؤال الخامس:- (١٠ درجات)

- أ- ماهى التربة، وكيف تكونت؟
- ب- ماهى أهم الفروق بين التربة المتماسكة والتربة الغير متماسكة؟
- ت- أذكر أمثلة على بعض أنواع التربة ذات المشاكل موضحا الأضرار التى تسببها للمنشآت.
- ث- كيف يمكن تصنيف التربة طبقا لقطر حبيباتها؟
- ج- وضح لماذا يعتبر الهبوط النسبى أكثر خطورة على المنشأ من الهبوط الكلى، وما هى قيم كلا من الهبوط الكلى والهبوط النسبى المسموح بها للأساسات طبقا للكود المصرى لتصميم الاساسات.

السؤال السادس:- (٩ درجات)

- أ- ما المقصود بفقاعة الضغط داخل التربة، وكيف يمكن أن يؤثر أبعاد الأساس على حجمها.
- ب- أذكر مع التوضيح بالرسم الأنواع المختلفة للأساسات السطحية.
- ت- متى يتم اللجوء لاستخدام الأساسات العميقة بدلا من الأساسات السطحية؟
- ث- أذكر أنواع الخوازيق المستخدمة فى الأساسات العميقة وذلك تبعا لطريقة تنفيذها.
- ج- المطلوب حساب قيمة الاجهادات الكلية المتولدة فى كابل كهربائى نتيجة لحمل موزع مقداره ٨.٠ طن/م^٢ يؤثر بمنتصف قاعدة أبعادها ١.٠ x ١.٠ متر تقع على سطح الأرض، اذا علمت أن السطح العلوى للكابل يقع على عمق ٢ متر أسفل الأساس وأن وزن وحدة الحجم للتربة الموجود بها الكابل هو ١.٩ طن / م^٣
- ملحوظة: استخدم الطريقة التقريبية لحساب الاجهادات الناتجة عن الحمل المركز.

With the best of wishes.....

examiners:

Dr. Ahmed Farouk,

Dr. Sobhy A. Younes

Course title: Civil Engineering

Course code: 21H3

Second Year : First term

Date: January 23, 2012

Allowed time: 3 hours

No. of pages : (2)

السؤال الأول (١٥ درجة):

- أ. أذكر بالتفصيل الخطوات العملية اللازمة لقياس طول خط أ ب بالطرق المختلفة إذا علمت أنه:
- يمكن رؤية كل من نهايتي الخط أ ب من الأخرى ويصعب التوجيه بسبب وجود بحيرة بينهما.
 - لا يمكن رؤية أي من نهاية الخط أ ب من الأخرى بسبب وجود عائق (مبنى مرتفع) بينهما يعوق الرؤية والتوجيه معا.
 - نقطة أ تقع علي الجانب الأيمن لترعة القاصد ويمكن أن يحتلها الراصد أما نقطة ب فتقع علي الجانب الآخر من الترعة ولا يمكن الوصول إليها. (٦ درجات)
- ب. حول المقاييس الآتية إلي مقاييس عددية:

١٦/١ من البوصة للميل - ٢,٥ بوصة لكل ٥ كيلو متر -

٢.٥ سم لكل ٢٠ ميل - ١٢,٥ مم لكل ٢٥٠٠ ذراع. (٣ درجات)

- ت. المطلوب تصميم ورسم مقياس رسم تخطيطي ١ : ٢٠٠ يقرأ مباشرة إلي أقرب ٠,١ من القسبة ثم استعمل المقياس لرسم قطعة أرض رباعية الشكل حيث أ ب = ٨,٣ قسبة ، ب د = ٥,٤ قسبة ، د د = ٧,٧ قسبة ، د أ = ٥,٧ قسبة ، د ب = ٨,٢ قسبة ، ثم استنتج طول القطر أ د. (٦ درجات)

السؤال الثاني (١٥ درجة):

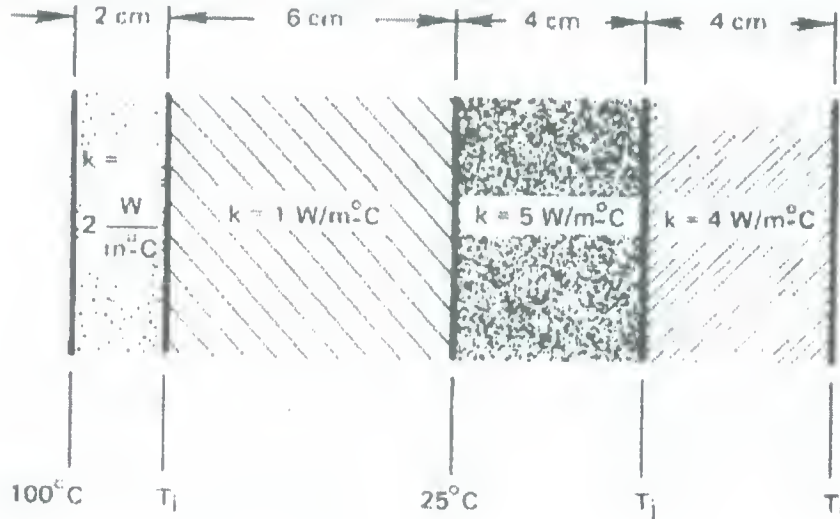
- أ- اشرح بإيجاز خطوات الرفع المساحي باستخدام الشريط مع شرح طريقتين للتحشية موضحا إجابتك بالرسم. (٣ درجات)
- ب- قيس خط بين نقطتين علي مستوي انحداره ١ : ٥ فوجد أن طوله ١٠٩,٢٥ متر. وبعد إتمام القياس أختبر الشريط فوجد أن طوله ينقص بمقدار ١١ سم عن طوله الاسمي وهو ٢٠ متر فما هو الطول الذي يعين به هذا الخط علي خريطة مرسومة بمقياس ١ : ٥٠٠. (٦ درجات)
- ت- منطقة مائية في الميناء مربعة الشكل ومحاطة علي أضلاعها بأسلاك يتدلي منها الغام وكان طول كل سلك نصف كيلو متر ونتيجة لثقل الأغلام حدث ترخيم في السلك بلغ مداه في المنتصف من كل سلك قدره ٢٠ مترا. ما هي مساحة قطعة الأرض بالمترا المربع وبالفدان وما هو الخطأ النسبي في حساب المساحة؟ (٦ درجات)

السؤال الثالث (١٥ درجة):

- أ- اشرح الخطوات العملية اللازمة لإيجاد الزاوية المحصورة بين ضلعي مبني مقام إذا علمت أن إمكانية القياس من الخارج فقط وباستخدام القياسات الطولية. (٣ درجات)
- ب- عند إجراء ميزانية طولية علي قطاع طولي كانت قراءات القائمة:
- ٣,١١ - ٢,٥٨ - ١,٩٧ - ٢,٠٨ - ٢,٨٥ - ١,٥٩ - ١,١٢ - ٢,٩٥ - ٠,٨٤ - صفر - صفر - ١,١٨ - ١,٢٤ - ٠,٤٤ - ٠,٢٣ - ١,١٣ - ١,٨٧

and delivery pipe is 20 cm and length of suction pipe 5.5 m and length of delivery pipe is 20 m. the friction factor of pipe material 0.04 m. Determine the shaft power input to the pump. Given pump efficiency 0.86.

5-What are T_i , T_j , and T_r in the wall shown in the following Figure



6-Determine the value of maximum temperature and its position of the wall with the uniform distributed heat source having volumetric rate of heat generation $q_v = 8 \cdot 10^6 \text{ W/m}^3$, the plate thickness 10 mm and thermal conductivity of the plate material $K = 20 \text{ W/m} \cdot ^\circ C$, the surface temperature of the plate are $T_{w1} = 80^\circ C$, $T_{w2} = 80^\circ C$

With my best wishes

Final Exam 2011-2012

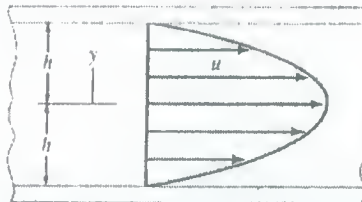
- 1- Automobile engine that operates on four-stroke engine produced brake power 94 kw at speed 2000 rpm, number of cylinder 6 cylinder, cylinder diameter 80 mm, stroke length 108 mm.

Calculate:

- Stroke volume
- Engine capacity
- Brake mean effective pressure
- Torque.

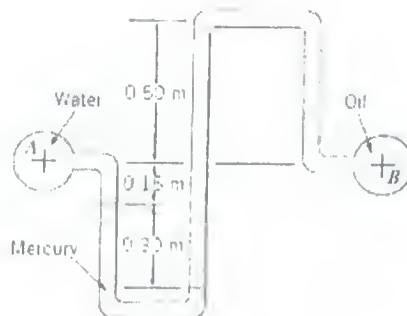
- 2- The velocity distribution for the flow of a Newtonian fluid between two wide, parallel plates is given by the equation

$$u = \frac{3V}{2} \left[1 - \left(\frac{y}{h} \right)^2 \right]$$



Where V is the mean velocity. The fluid has a viscosity of 0.04 pa. s. When $V = 2$ m/s and $h = 0.1$ m determine: (a) the shearing stress acting on the bottom wall, and (b) the shearing stress acting on a plane parallel to the walls and passing through the centerline (midplane).

- 3- The mercury manometer of Fig. indicates a differential reading of 0.30 m when the pressure in pipe A is 30-mm Hg vacuum. Determine the pressure in pipe B.



- 4- A centrifugal pump deliver $0.2 \text{ m}^3/\text{s}$ discharge of the water from suction reservoir in to delivery reservoir. The static suction head 5 m blow the atmospheric pressure and static delivery head 18 m above the atmospheric pressure. Diameter of suction